ARCHIVES OF OTOLOGY.

THE TEMPERATURE OF THE EXTERNAL AUDITORY CANAL.

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THE temperature of the external auditory canal has been repeatedly studied by various authors. The necessary experiments were not, however, always conducted from the same point of view. In some cases the investigation was purely physiological, in others devoted to the determination of the conditions governing heat-production in the cranial cavity during cerebral disease; in others, finally, the influence of certain drugs on the blood-vessels of the brain was to be elucidated. We shall only refer to such experiments as have a direct bearing on the subject under consideration.

According to J. van der Becke Callenfels,[1] who experimented with rabbits, the temperature of the ears rises and falls rapidly with a corresponding change in the temperature of the surrounding atmosphere; the temperature of the ears is influenced by variations in the temperature of the internal organs; and diminished blood supply to one ear causes a rise of temperature in the other. "After section of the sympathetic nerve on one side, we have increased supply of blood, and hence a rise of temperature in the ear of the same side, and simultaneously the temperature falls in the ear of the opposite side. If we now cut the second sympathetic nerve, the temperature of the colder ear rises, and simultaneously the temperature of the ear originally warmer falls."

[1] Henle's *Zeitschrift f. rationelle Medicin*, neue Folge, vol. vii., 1855, pag. 173, *seq.*

Albers[1] examined the temperature of a large number of insane people, and found differences of one or even of several degrees in the temperature of the temples, the ear, the neck, and the hand.

According to Ludwig Meyer[2] the physiological temperature of the rectum and of the temporal fossa never varies more than 0.1°; in certain phases of progressive paralysis, however, the temperature of the temporal fossa exceeds that of the rectum by 0.3°.

According to Mendel[3] hypnotic doses of chloral depress the temperature of the external auditory canal considerably, without influencing the internal temperature, as measured in the rectum. Morphine has the specific effect of reducing the temperature of the external canal, which Mendel believes to be due to an isolated irritation of the vaso-motor nerves supplying the carotid system.

Weber Liel,[4] who is the only one thus far, I believe, who has studied the temperature of the external auditory canal in aural diseases, states that in malarial neuralgia affecting any branch of the nerve supply of the ear the paroxysms are accompanied by a rise in temperature in the external auditory canal to 39°, the temperature in the axilla remaining at 37°.

I have measured the temperature of the external ear in a large number of cases of aural disease (over fifty), and measured the temperature repeatedly in each case. The result thus obtained will be given in the following pages.

At first I used a small clinical thermometer, which I was obliged to abandon, however, as it caused pain, and was never tolerated more than five minutes at a time. Since then I have made exclusive use of the aural thermometer designed by Urbantschitsch and manufactured by H. Kapeller of Vienna. This thermometer is composed of three horizontal pieces meeting at right angles, and a vertical piece, which is graduated (33–45° C.). The reservoir is 15 *mm.* long, and cylindric in shape, and is contained in the

[1] *Zeitschrift f. Psychiatrie*, vol. xviii., pag. 45, *seq.*
[2] *Annalen d. Charité Krankenhaus*, vol. vii., 2, 1858, pag. 171, *seq.*
[3] *Virchow's Arch.*, vol lxii., 1875, pag. 132, *seq.*
[4] *Monatsschrift f. O.*, vol. xii., 1878, No. 5.

end of the horizontal piece, which is introduced into the ear. Separate thermometers are needed for the right and the left ears, the temperature being taken in both ears simultaneously. These thermometers are held in place in the ears by two clamps attached to a head-band by ball-and-socket joints.

These thermometers create only slight irritation, if properly fastened; they are, however, irksome to the patient, as he is obliged to refrain from moving his head or speaking. Movements of the head and of the lower jaw necessarily cause pain.

The outer end of the reservoir is surrounded by a close-fitting rubber tube for the purpose of closing the external canal against the surrounding atmosphere; in addition to this the spaces between the thermometer and the walls of the auditory canal are packed with cotton, and, in order to make the closure as perfect as possible, the external layer of cotton is coated with some fatty substance.

Both aural thermometers, as well as the clinical thermometer, with which I take the temperature in the axilla, were compared with the standard thermometer by Mr. Kappeller, and the necessary corrections noted. The aural thermometers were introduced into the auditory canal to the depth of 18 *mm.*, *i. e.*, to the bony portion of the canal, in which, as my experiments prove, the temperature is higher by several tenths of a degree than it is in the cartilaginous portion. When pushed further inward, the aural thermometer causes severe pain. All three instruments were kept in place the same length of time, usually half an hour, occasionally an hour.

The influence of the lower temperature of the surrounding atmosphere on the temperature of the external auditory canal was studied during the winter on patients who had been seated in a cold room for thirty minutes or longer. In some of these cases, particularly in the anæmic, the temperature sank to 36°, while in the robust it was found to be 37° or even higher.

Callenfels (*l. c.*) experimented in the same direction on rabbits. Cooling of the atmosphere after a series of hot

days caused pallor of the ears and a reduction of the temperature in the ears, so that it exceeded the temperature of the atmosphere by 1–5° only. As the temperature of the ears, according to Callenfels, is regulated by internal causes, and not by local influences, we would not expect the temperature of the ears in man to sink much below the normal, even when exposed to cold air for a long time.

The temperature of the ears bears no constant ratio to the temperature of the body. Frequently no difference between the two is observed; in the majority of cases, however, the temperature of the axilla is higher than that of the external auditory canal by 0.1–0.3°. The same results were reached by Mendel (*l. c.*), with this difference: he measured the temperature of the body in the rectum, while I could use only the axilla for this purpose. In the chronic insane, this author often found the normal difference; in some cases an increase in this difference to 0.6°, or a decrease to 0.05°. There was no constancy or regularity about these variations.

Both in my experiments and in those of Mendel, the maximum height of the mercurial column was attained in about ten minutes. The circumstances which caused exceptions to this rule will be explained further on.

In the two ears we may find the same temperature within a few hundredths of a degree, or differences of 0.1–0.3°. No rule could be deduced from these variations.

It is not evident whether the above-mentioned authors measured the temperature of both ears; and particularly whether they measured it in both ears simultaneously.

Broca,[1] however, used a "Crown of Thermometers," consisting of six thermometers, contained in cases, lined with cotton. This was applied to the skull from twenty to thirty minutes in such a manner that one thermometer rested on the external orbital margin, one on the occiput, and one at the height of the ear symmetrically on either side. His conclusions read as follows: The physiological temperature of the left side is higher by 0.1° C. than that of the right side. The physiological temperature of

[1] *Centralblatt, f. d. medic. Wissenschaften*, 1878, page 31.

the vertex is higher by 0.1° C. than that of the frontal or of the occipital region. Mental activity increased the temperature of the right side of the brain more than that of the left. In embolic processes affecting one side of the brain the temperature of the temples is lowered, while the temperature of the forehead and of the occiput is increased on the side affected.

Broca applied his thermometer at the *height* of and not to the interior of the external auditory canal, a fact to be borne in mind since my experiments show the temperature of the deeper portion of the external auditory canal to be higher than that of the peripheral portion (*v. s.*).

My experiments did not enable me to determine positively which side, as a rule, has the higher temperature. The higher temperature is found as often on the right as on the left side in different individuals, and might even vary in the same individual if the temperature be taken at different times.

For instance: John M., aged fifty-nine, suffers from loss of hearing and constant tinnitus aurium. On both sides drum-head sunken and thickened.

April 11, 1883: right ear 36.6°; left ear 36.9°C.
May 9, 1883: " 36.8°; " 36.6°C.
" 28, 1883: " 36.9°; " 36.7°C.
June 7, 1883: " 37.3°; " 37.2°C.

As a rule the temperature of the external auditory canal varied between 36.8° and 37.4°, these limits being exceeded to a marked degree in a few cases only. Increased temperatures in the external auditory canal were not found in any case without a similarly increased temperature of the body.

In only one of my cases was the temperature of the diseased ear higher than that of the axilla. The case was one of tympanitis phlegm. on the right side.

Anna R., æt. twenty-five, right ear, tymp. phlegm.; left ear, normal. May 23d: right ear, 37.4°; left ear, 36.8°; right axilla 37.1°C. May 26th: inflammation subsiding; right ear 37.1°; left ear 36.7°; right axilla 37.2°C.

This condition may, however, obtain in other diseases of the ear, as Weber Liel (*l. c.*) found the temperature of the

affected ear 2° higher than the temperature of the axilla in cases of malarial neuralgia of the ear. I had no opportunity of examining such cases.

A marked increase of temperature in the diseased ear, as compared with the other, apparently normal ear, sometimes reaching 0.6°, was several times seen in unilateral phlegmonous inflammation. It was furthermore found in acute purulent inflammation of the middle ear and in the chronic form of tympanitis purulenta, characterized by marked vascularization of the mucous membrane and injection of the remnants of the drum-head. The formation of polypi had no apparent effect on the temperature.

The following is an example of tymp. pur. acuta:

Josephine Ph., æt. thirty-one. Right ear: tympanitis pur., with great pain since ten days.

April 10th.—Right ear, 37.7°; left ear, 37.1°; right axilla, 37.9°C.

April 12th.—Right ear, 37.6°; left ear, 37.1°; right axilla, 37.6°C.

April 19th.—Tymp. pur. cured; right ear, 37.7°; left ear, 37.7°; right axilla, 37.9°C.

May 2d.—Right ear, 37.5°; left ear, 37.3°; right axilla, 37.8°C.

In tympanic affections of a less active character the temperature was the same or nearly the same, as a rule, in the two ears, and the relation between the temperatures of the ear and the axilla was normal. But in those cases in which the temperature was considerably higher on the affected side than on the normal side, it did not exceed the temperature of the body at all or only by a trifle; the temperature of the normal ear, however, was often markedly lower than that of the body. I do not know whether this phenomenon is to be explained by the law of Callenfels (*vide supra*), that increased blood supply to one ear causes a fall of temperature in the other, but would emphasize the fact, that there is no absolute rise of temperature in the abstract at the point of inflammation, *i. e.* in the diseased ear. The temperature was only relatively higher in the ear affected, as compared with the healthy ear; but compared

with the temperature of the axilla, it was within the normal range.

In otitis externa circ., where the pathological condition would almost seem to postulate a rise of temperature, no increase of temperature was observed in the diseased ear as compared with the unaffected ear or the axilla. The maximum height of the mercurial column was, however, reached earlier on the affected side than on the healthy side.

The following case shows the condition of the temperature in otitis externa circ. It furthermore proves, that febrile temperature of the body is always accompanied by febrile temperature in the ext. auditory canal, even when both ears are free from inflammation.

Josephine P., æt. sixteen, right ear : otit. extern. circ. since three days.

May 22d.—Right ear, 37.3° ; left ear, 37.4° C.

May 25th.—Otit. ext. circ. cured. Two days ago patient caught cold ; yesterday she was obliged to keep her bed ; to-day she is still indisposed. Right ear, 38.3° ; left ear, 38.2 ° ; left axilla, 38.4 ° C.

June 2d.—Three furuncles in left ext. audit. canal. Right ear, 37.6 ° ; left ear, 37.6 ° ; right axilla, 38.4° C.

I may here also mention the fact that the temperature not only of the two ears, but also that of the mastoid antrum and of the internal canal, is sometimes the same. This occurred in a case, which I have more fully described in a paper entitled : Cases of Periostitis and Caries of the Mastoid Process,[1] and in which both mastoid processes were the seat of large fistulæ leading into the mastoid antrum. An aural thermometer was introduced into the largest fistula in the left mastoid process, with all the precautions detailed above ; another thermometer was introduced into the right ext. audit. canal. They both registered 36.9° C., *i. e.* the temperature was the same in the right ext. audit. canal and in the left mastoid antrum.

The influence of the hypnotic state on the temperature of the ear was studied in the case of a girl, aged twenty-

[1] *Wiener med. Presse*, 1882, No. 46-50.

two, who was suffering from chronic inflammation of the tympanum. This patient would go into a trance on looking attentively at any bright article, or on looking into a common mirror for more than two or three minutes at a time, and was easily awakened by a breath of air blown into her face. During the trance the sensibility was diminished to such an extent, that a needle pushed through a fold of skin on the back of the hand or on the arm gave rise to no reaction on the part of the patient; the facial expression was one of deep sleep, the respiratory movements being reduced in frequency. On awaking the face became flushed, and the patient was somewhat excited, but she regained her previous equanimity after walking a few minutes in the open air. The most careful observation of the mercurial column before and during the hypnotic state, which was allowed to last five minutes in the first experiment, and ten minutes in the second experiment, made a few days later, showed absolutely no change in the temperature.

Massage of the ear[1] and inflation of the middle ear had no effect on the aural temperature.

Removal of polypi was occasionally followed by an immediate fall in the temperature. After a certain time the temperature commenced to rise, reaching a point higher than that registered before the operation. The measurements made under these circumstances were, however, not sufficiently uniform to enable me to draw any conclusions from them. The initial fall and subsequent rise of the temperature may perhaps be explained by assuming that the vaso-constrictors were irritated by the snare used in the operation, the irritation causing at first a contraction of the vessels and a diminution of the blood supply, and subsequently with the reaction a dilatation of the vessels and a rise of temperature. The initial fall may also have been due in part to the loss of blood incidental to the operation. The interval between the fall and the rise of temperature varied. But an identical fluctuation in the temperature was frequently observed in the other ear, which had not been subjected to any kind of manipulation.

[1] *Wiener medic. Presse*, 1883, Nos. 26–30.

Similar changes in the temperature were observed after paracentesis of the drum-head in cases of acute suppurative tympanitis. Temporary fluctuations were also caused by syringing the diseased ear, but they were limited almost always to the ear treated. We thus see that the rule, according to which an increase of temperature in one ear causes a reduction of temperature in the other, does not apply to these cases. The temperature of the water used in syringing is not, moreover, without influence on the result of the measurements, as will be shown further on.

The effect of the application of cold to the anterior and the lateral surfaces of the neck, on the temperature of the external auditory canal, has been studied by Wilhelm Winternitz.[1] This author considers the temperature of the external auditory canal to be the most sensitive measure of the temperature, and hence the circulation, of the head. "I regard," he says, "the temperature in the external auditory canal as a more sensitive test than the ophthalmoscopic examination; for slight changes in the calibre of the retinal vessels can be overlooked more easily than a change in the height of the mercurial column. The elasticity of the ocular tunics, and the positive intra-ocular pressure may, moreover, prevent many disturbances in the circulation of the head from manifesting themselves in the eye, while they will still be revealed by fluctuations in the aural temperature."

Winternitz applied cold cloths, changing them every minute. After thirty minutes the temperature had fallen 0.25°. Forty minutes after the discontinuance of the application the temperature was found to have risen 0.2°, but had not yet reached its original height.

Weber Liel proved by means of the aural thermometer that the application of cold in acute aural diseases[2] has a rapid and marked antiphlogistic action, and recommends this therapeutic measure highly. He says: "I have made the experiment repeatedly as follows: The aural thermometer was introduced and retained in the external auditory

[1] *Die Hydro-therapie*, 1877, pages 76 and 77.

[2] *Monatsschrift f. O.*, Bd. xv., 1878, No. 1.

canal of the inflamed ear twenty to thirty minutes, and the temperature recorded; in acute inflammations it varied between the periods of exacerbation between 37.5° and 38.5°. Cold cloths were now applied constantly from half an hour to an hour. The temperature was then found to have fallen five to eight tenths of a degree C."

My experiments on this point were made as follows: A thermometer was placed in each ear, and when the mercurial column had become steady the thermometer was taken out of one ear and water at 26° C. was injected repeatedly. The temperature fell very slowly and remained for some time 1° below its previous height. In other experiments water at 40° C. was used, when the temperature rose very rapidly, exceeding its previous height by some tenths of a degree. In both series of experiments all effect was lost after thirty minutes, the lower and the higher temperature returning to the height registered before the injection. The temperature of the other ear remained unchanged or sank in a few cases about 0.1°.

It is evident from the experiments above detailed that very few facts concerning the temperature of diseased ears have as yet been ascertained, and that these cannot be formulated into laws generally applicable. This becomes the more apparent the greater the number of thermometrical examinations made in the different forms of disease. With the exception of a few general laws, in which the margin for accidental variation is, however, exceedingly ample, the statements of authors as to the temperature in diseased or inflamed parts vary considerably. While some have found the temperature of inflammatory foci higher than that of the body, others have never seen the temperature of inflamed organs higher, but occasionally lower, than that of the body. Billroth[1] measured the temperature of forty-eight wounds, and found it higher at the point of inflammation than in the rectum in two cases only. Jacobson and Bernhardt[2] found the temperature of the inflamed pleura and of the inflamed peritoneum to be below that of the heart by several tenths

[1] *Archiv f. Klinische Chirurgie*, 1865, vol. vi., p. 381.
[2] *Centralblatt f. d. medic. Wissenschaften*, 1869, p. 290.

of a degree in every case. Their conclusions read as follows: "Without a single exception the temperature of the inflamed part was seen in our experiments to be lower than the temperature of the heart, and we therefore believe the idea, prevalent in modern pathology, that inflamed tissue is the seat of increased oxidation, and therefore of increased temperature, to be erroneous, and that John Hunter's dictum: Local inflammation does not increase the temperature of any part, beyond the temperature of the organs of circulation, is correct."

A large series of carefully conducted experiments and improved methods of examination will be required to disclose all the facts bearing on the temperature in disease generally, and in disease of the ear in particular.

TWO RARE CASES OF MECHANICAL INJURY TO THE ORGAN OF HEARING.

By S. MOOS, in Heidelberg.

Translated by Charles J. Kipp.

CASE I.—BILATERAL LABYRINTHINE DISEASE WHICH WAS DEVELOPED FIFTEEN MINUTES AFTER A STAY OF THIRTY HOURS' DURATION IN A DIVING APPARATUS. A CONTRIBUTION TO THE PATHOLOGICAL EFFECT OF COMPRESSED AIR.

IN his observations on the behaviour of the organ of hearing in compressed air, Magnus[1] has among other things pointed out the injurious effect of such air upon this organ; he has shown that the air pressing into the external canal is the cause of the pain; that the degree of the pain itself varies in different individuals, and that, while the pain lasts, the membrana tympani is actually pressed inward by greatly compressed air. Serious lesions of the organ of hearing were not observed by Magnus himself. He mentions, however, that Francois, who made his observations during the building of the bridge at Cologne, speaks of hemorrhage from the ear.

Magnus's observations were made at a depth of from thirty to forty feet, and under an atmospheric pressure of from two to two and a half atmospheres.

My observations were made on a man twenty-six years of age who had worked, with but short interruptions, for thirty-six hours under a pneumatic air pressure equal to nine meter water pressure, and had suddenly left the equal-

[1] *Archiv f. Ohrenheilk.*, Bd. i., p. 269.

izing chamber, on the call for help from a fellow-workman, and had then gone to an inn where he ate and drank.

About a quarter of an hour after leaving the chamber—on the 23d of September, 1882—he felt giddy and sick; later, he also vomited. On the same day he was put under the care of Dr. Rembe, in Ludwigshafen, whose report is as follows:

"The patient has been under my treatment since the 23d of September, 1882. In the beginning he complained of severe vertigo which made it impossible for him to walk; of hardness of hearing, and tinnitus aurium. The patient attributed his illness to working too long under increased atmospheric pressure. The examination made at that time showed almost absolute deafness of the left ear and great impairment of hearing of the right ear. The drum membranes were somewhat sunken, but there was neither perforation nor hemorrhage. The patient was at that time unable to stand erect without support, and reeled about like a drunken man. While in the recumbent position the vertigo was diminished, but the roaring in his ears prevented his sleeping soundly.

"The treatment consisted at first in absolute rest, spare diet, laxatives, and the bromide of potassium. The air douche which was carefully used a few times for diagnostic purposes increased the vertigo but did not improve the hearing. In the course of the following weeks there was some improvement as regards the vertigo, and perhaps also in hearing. He was now given the iodide of potassium alternately with the syrup of the iodide of iron, and tincture of iodine was applied to the mastoid process."

On the 15th of March, 1883, the patient's condition was as follows: He is pale and looks as if he was suffering; he still walks with his legs spread apart; complains of giddiness, noises in the ear, and sensitiveness of head.

Examination showed the right drum membrane normal; in the left there is a small atrophic spot (scar?) in front of the handles of the malleus. Bone conduction for the watch is absent. The C tuning-fork is felt but not heard, and causes pain in head.

C^1 is neither felt nor heard.

A^1 the same.

No tuning-fork held in air is heard. Speech is not at all

understood by the left ear, and by the right only on shouting directly in the ear.

Diagnosis: hemorrhage in both labyrinths.

Treatment: salt-water baths in Dürkeim for four weeks.

June 5th.—The patient's employer, who was willing, as he stated in his letter of March 7, 1883, to defray the expenses attending a sojourn of four weeks' duration in Heidelberg, declined to pay the cost of the baths in Dürtheim, and as the patient himself is without means, nothing has been done since in the way of treatment. He now hears loud speech somewhat better with the right ear. The left ear is totally deaf. The C tuning-fork still causes a disagreeable, painful feeling; C^1 only a humming; A^1 placed between the teeth produces a sensation. Treatment: thirty baths of kitchen-salt and Kreuznach mother-lye, at a temperature of 27° R., the patient to remain thirty minutes in the bath.

July 27th.—Speech is understood better in the right ear, but not at all in the left. The patient walks better. The patellar reflex is normal on both sides. Patient complains chiefly of the noises in the head. Treatment: ferr. iod. five grammes, to be made into one hundred pills.

August 7th.—Patient walks better and looks better. He suffers from constipation, and the dose of the iodide of iron is therefore reduced, and an occasional dose of castor oil ordered. After taking all the pills of iodide of iron prescribed, he is to take none for two weeks. The examination showed no change in the right drum membrane. The left was hyperæmic, and showed increased lustre.

October 16th.—The functional examination gives the same results as at last visit. Is still constipated. Treatment: laxative pills.

The patient now instituted a suit for damages against his employer, and I was ordered by the district-court in Frankenthal to give my opinion as an expert as to the condition of the plaintiff, "who, in consequence of the accident, was confined to his bed and under medical treatment for six weeks, was unable to walk, and suffered from headache, noises in the ears, and intense vertigo; who, in consequence thereof, was entirely incapacitated for work till the beginning of May of this year; who is still, and will be prob-

ably always unable to do more than a very limited amount of work, as he is unable to stoop; who cannot endure being in the sun or in a noisy workshop, and is still under medical treatment; and whether the illness resulted from the plaintiff's working too long, under too high atmospheric pressure, for the defendant." The case did not, however, come to trial, as a settlement was effected but a few days before the meeting of the court.

REMARKS.

There can be no question that this suddenly developed ear disease, which manifested itself by nearly total deafness of both ears, tinnitus aurium, and vertigo, followed by staggering gait and inability to stand without support, was caused by his leaving suddenly the diving apparatus, after working in it under an atmospheric pressure of two atmospheres, with but short intermissions, for thirty hours. These symptoms were probably the result of a hemorrhage in the labyrinth. The following appears to be the most plausible explanation of its genesis.

During his long stay in the strongly compressed air the tension within his blood-vessels was also greatly increased. With the blood pressure thus increased he left the diving bell, and, as a consequence of the too great difference in the tension within and without the blood-vessels during the first fifteen minutes after leaving the diving apparatus, a rupture of blood-vessels occurred in both labyrinths. But why this should have taken place only here, I am unable to explain.

I should therefore have had no difficulty in answering the question put to me by the court, whether the defendant made the plaintiff work for too long a period under too high atmospheric pressure; and as little in replying to the query, whether the complete disability to do work at first, and the partial incapacity for work subsequently, was caused by the accident. If the case had come to trial, the decision of the judge would probably have depended on the circumstance, whether the plaintiff had been warned of the danger to which he exposed himself by leaving suddenly the diving apparatus, and if so, whether the plaintiff had disregarded this warning.

During the last four years, cases of disease of the spine resulting from the sudden diminution of the atmospheric pressure have been reported by Leyden [1] and F. Schultze.[2] and the conditions found at the autopsy in these cases induce me to discuss the subject somewhat more fully.

Leyden reports on the accidents which occurred to the workmen engaged in building the Liteiny Bridge in Russia. Working under high atmospheric pressure these men suffered from many different complaints, the most frequent of which were pain in the ears on entering and leaving, and pain in the joints after leaving the chamber. Besides these, the attending physician (Dr. Lehwess) had under his observation three cases of paraplegia, of which two with well-marked paralysis completely recovered in the course of a few weeks, while the other died on the fifteenth day of the disease. Leyden, who made the autopsy, found, on macroscopic examination no discoloration or residues of hemorrhages in the spinal cord. With the microscope he found, however, a spotted appearance in the thoracic portion, light yellow points being here sprinkled on the dark background. These foci consisted of heaps of large cells, and seemed to be sprinkled into the substance of the posterior columns. They were lying in the fissures in the torn nervous tissue. The round cells were of the size of granular corpuscles, and were lying loose by the side of each other in the crevices. There were no remnants of nerve fibres and neuroglia, *no remains of blood*, and *no shoals of pigment*. It is thus seen that small rents existed in the substance of the spinal marrow, but there is no evidence that these fissures were caused by extravasations of blood. According to Leyden, much rather is the assumption justified that they were caused by gas (O and CO^2) given off by the smallest blood-vessels or directly by the plasma when the barometric pressure was suddenly lowered.

[1] E. Leyden: On affection of the spine caused by a sudden decrease in the barometric pressure. *Arch. f. Psych.*, Bd. ix., page 316.

[2] F. Schultze: Contribution to the pathology and pathological anatomy of the nervous system. A contribution to our knowledge of spinal affections resulting from a sudden diminution of the atmospheric pressure, etc. *Virchow's Archiv*, Bd. lxxix., p. 124.

Schultze's case relates to an Italian workman, eighteen years old, who, while engaged in excavating a well, remained frequently for six hours in the caisson, under a pressure of from one to three and two tenths atmospheres. After leaving the caisson one day both ankle-joints became painful, and twenty minutes later the lower extremities were completely paralyzed. There was also paralysis of the bladder and rectum, and diminished sensibility as far up as the navel. Gangrene, etc., caused death ten weeks later. The macroscopic examination failed to discover any thing abnormal in the spinal cord. The condition known as "leucomyelitis disseminata dorsalis" was revealed by the microscope. In the lower part of the lumbar enlargement, the anterior portion of the lateral columns on both sides had undergone typical degeneration. In the cervical portion was found ascending degeneration of Goll's bundles and of the middle of the peripheric portion of the lateral columns. In the parts which had undergone the greatest change, the nervous elements had entirely disappeared, and in their stead were seen finely granulated cells. The vessels were of abnormal thickness. No extravasation, no blood-pigment or hæmatoidin could be found anywhere here, the same as in Leyden's case. Yet Schultze doubts that the gases given off from the vessels could have caused the injury to the spinal marrow, as the suddenly diminished atmospheric pressure would also have set free gas bubbles in the larger vessels, especially in the lungs, and thus have given rise to a dyspnotic condition, of which, however, no mention is made in either case. Finally, Schultze points out as remarkable, the absence of changes in the gray substance, which is so rich in capillaries, and says that the cause of the alterations found is not yet fully known.

Notwithstanding this absence of hemorrhages and their derivatives, pigment, &c., in the spinal cord of both the above cases, the supposition, that in my case a hemorrhage occurred in both labyrinths, need not be rejected absolutely, since it is well known that in aëronauts, when they have very rapidly ascended to high regions, regions in which a much lower pressure prevails, very often hemorrhage occurs

from the mucous membrane of the nose, the eyes, and other parts. The hypothesis that this injury to the nervous apparatus of the labyrinth was caused by gas which escaped from the vessels, seems, at least in my case, to be somewhat strained.

An attempt to explain this disturbance of function by a suddenly developed cerebellar disease could only end in failure.

Disturbed co-ordination, manifested by a staggering gait and intense vertigo, especially if accompanied with vomiting, points undoubtedly to disease of the cerebellum, and more particularly to an affection of the vermiform process, but other positive signs were wanting in our case. The whole course of the disease, moreover, contradicts this theory.

Results of Physiological Experiments Relative to Influence of Increased and Diminished Atmospheric Pressure upon Man and the Lower Animals.

For the sake of completeness, I shall state here briefly the results obtained, although I have been able to read in the original only the most recent of the papers on this subject, the ones by Lazarus and Schirmunski.

In opposition to Panum, Paul Bert, in his work "La Pression Barométrique," states that the arterial blood tension is in compressed air considerably increased by the mechanical effect of the pressure. H. Jacobson and Lazarus[1] were able to confirm Bert's proposition from experiments on lower animals. In the majority of their observations, there was an unmistakable increase in aortic tension, which outlasted the phase of the constant, and sometimes also that of the decreasing, air condensation. But while Bert observed an ascent of $\frac{1}{5}$ of the original height, H. and L. saw an increase of only $\frac{1}{12}$ to $\frac{1}{8}$ of the original value.

In a recently published paper by Lazarus and Schirmunski,[2] I find mention made of the fact that Fränkel and

[1] *Med. Centralblatt*, 1879, No. 51: "Ueber den Einfluss des Aufenthaltes in comprismirter Luft auf den Blutdruck."

[2] "Ueber die Wirkung des Aufenthaltes in verdünnter Luft auf den Blutdruck." *Zeitschrift f. klin. Med.*, von Frerich and Leyden, Bd. vii., Heft 3, pp. 299–314.

Geppert in a monograph, "Ühr die Wirkung der verdünnten Luft auf den Organismus," based upon a series of experimental observations, concur in Bert's conclusions.

Lazarus and Schirmunski experimented with Basch's sphygmomanometer. The sessions in the pneumatic cabinet lasted one hour. During the first twenty minutes the atmospheric pressure was gradually reduced 3½ atmospheres = 380 *mm.* barometric scale; during the next twenty minutes the pressure was kept at this point, and during the last twenty minutes it was gradually increased again up to the ordinary atmospheric pressure.

From an examination of the charts, it appears that a decrease of ½ atmosphere causes the blood tension to sink from 28 to 30 *mm.* mercury. This sinking of the blood tension does not, it is true, keep pace with the fall in the atmospheric pressure, but it certainly occurs under its influence, inasmuch as it not only continues, and even constantly increases, during the whole time the pressure is diminished, but always rises again simultaneously with an increase of atmospheric pressure, without, however, returning to the height present at the beginning of the experiment.

From the results obtained by the experiments on six persons, the authors draw the conclusion that the distribution of the blood is impaired at the least, as all of the persons suffered from dyspnœa, weakness, and distinct cyanosis during the period of greatest attenuation of the air.

From tracings obtained at the same time with Marey's sphymograph, it appears that the pulse was increased in frequency and was dicrotic, a condition which, according to Marey, Landois, and Rollet, is often associated with diminished arterial tension, and which is connected with the diminished vital capacity in airless space, discovered by Schirmunski in 1877.[1]

Recapitulation.—The effect of a stay in attenuated air on the blood tension is shown by a marked tendency in the curve, from the very beginning, to sink in the manner already described. This sinking outlasts more or less the period of

[1] "Ueber den Einfluss der verdünnten Luft," etc.—Inaug. Dissertation, 1877.

constant attenuation, and ceases usually at the close of the experiment. Practical result: patients with heart disease should not be sent to high altitudes.

CASE 2.—RUPTURE OF BOTH DRUM MEMBRANES FROM THE COMPRESSION OF AIR, PRODUCED BY THE EXPLOSION OF CHLORPHTHALIC ETHER DURING THE MAKING OF EOSIN.

H., æt. thirty-four, a chemist engaged in the manufacture of eosin, was grinding chlorphthalic acid in alcohol, three weeks ago, when suddenly a loud detonation occurred, in consequence, as he thinks, of the explosion of nascent chlorphthalic ether, a part of which entered both eyes. He was stunned for a short time by the compression of the air, produced by the explosion; a keratitis developed in both eyes, and roaring in his head and hardness of hearing—at first chiefly in the left ear—followed. On the fourth day he noticed a discharge of a chocolate color from his left ear: and, on the eighth day, the right ear also began to discharge. The keratitis was treated by Dr. Weiss.

Present condition: In the external canals, a moderate quantity of pus. The right drum membrane is perforated in anterior lower quadrant, and the remainder is thick and red. The left drum membrane is perforated in lower posterior part, otherwise it is in the same condition as the right. Speech is heard, on the right side, at four metres; on the left, at one metre. Bone conduction: weak watch-tick is heard on both sides; tuning-forks on left side only. The case was treated by the dry method. In both ears the perforation closed in two weeks. His condition, at the time of his dismissal from my care, was as follows: acuity of hearing, R $\frac{1}{2}$, L $\frac{1}{6}$. Slight intermittent tinnitus. The vessels along the handle of the hammer were still injected.

The patient's demand for indemnification for damages from his employer was refused. Had I been asked by the court for my opinion, I should have given it in favor of the injured person, for his hearing, will never again be normal in either ear, and his left ear in which there is still constant tinnitus, may possibly in time become entirely deaf from labyrinthine disease.

EXTENSION OF A NON-SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR TO THE PERILYMPHATIC SPACES OF THE LABYRINTH.

By S. MOOS and H. STEINBRUGGE, in Heidelberg.

Translated by Charles J. Kipp.

As the clinical history of the preceding case showed that the organ of hearing of the right side was likewise affected, and the *right temporal bone* had kindly been placed in our possession, we have examined this also. The result was as follows:

The mastoid process was also sclerotic; the roof of the antrum measured three *mm.* in thickness; the floor and the inner wall of the tympanic cavity were thickened and sclerosed. The sinus tympani was small and entirely filled with new connective tissue. There were adhesions between the limbs of the stapes, and in the niche of the oval, and of the round window. In the mucous membrane lining the plate of the stapes, and the ligament. orbiculare was found brown pigment. The lining membrane of the tympanic cavity was not materially changed. The drum membrane was retracted and funnel-shaped; its mucous membrane was opaque. The ossicles were slender and movable. The tube was normal, without the slightest textural change, and without any accumulation whatever in its free space.

MICROSCOPICAL EXAMINATION OF THE LABYRINTH.

Most of the blood-vessels were empty in consequence of the hemorrhage. The membrane of the round window was thickened, and in its inner surface was a deposit of masses

of crumbling detritus consisting of cells, which also filled the aqueduct cochlea in one place. At the junction of the anterior with upper wall of the vestibulum, a string of connective tissue, starting from the periosteum, extended from one wall to the other. The ligamentous attachments of the utriculus and of the ampulæ were thickened. Much brownish-red and yellow pigment, partly in the form of globes (separate or in groups), partly in heaps of granules, was found on the horizontal ampulla and its semicircular canal. Some of this was found scattered also in the epithelium of the utriculus.

Remarks.—The condition here found presents a true picture of an inflammation which has extended from the middle ear to the labyrinth. Here it manifested itself principally as a periostitis of the vestibule, along with which were seen small extravasations and new growths of connective tissue. These changes, together with the alterations in the round window and the occlusion of the aqueduct cochlea, would seem to explain sufficiently the disturbance of function which existed during life. There can be no doubt that this began while the patient was ill with typhus fever, and was increased by the tubal catarrh which developed during the fatal illness.

THREE RARE CASES OF EAR AFFECTIONS AS A CONSEQUENCE OF SYPHILIS.

By S. MOOS, of HEIDELBERG.

FIRST CASE.—*Continuous subjective noises in the head with apparently normal acuteness of hearing, the result of syphilis.*

The patient, a merchant, thirty-four years old, consulted me on the 12th of November, 1879.

History :—About ten years ago the patient, according to his own account, suffered undoubtedly from a dry, wide-spread skin eruption and, judging from his description, from an impetigo capitis. At the same time he had also an affection of the throat, and a slight swelling of an inguinal gland. He had no sore on the penis and no suppurating bubo. Under the repeated administration of mercury, iodide of potassium, and Zitmann's decoction, and a course of baths at Aachen six years ago, the disease was brought to a standstill.

Last spring the eruption broke out afresh on the head and skin. Two courses of inunction and another trial of the warm sulphur springs at Aachen eradicated the disease so completely that I could not discover on the examination of the naked patient even the slightest anomaly either of the skin, glands, bones, or in the throat. For two years the patient has suffered from a continual noise ; at first it was heard in both ears, then it moved into the head, principally in the parietal and occipital region, where he has heard it ever since. The before-mentioned treatment did not lessen it in the slightest degree. He has never as yet suffered from dizziness.

The *objective examination* of the nose, the naso-pharyngeal space, and the middle ear (with the catheter) gave an entirely negative result.

On the inner part of the superior wall of both external auditory canals, opposite the membrana flaccida, in a very symmetrical position is a heart-shaped white exostosis.[1]

The vessels on the handle of the malleus are injected, otherwise nothing worthy of note. The acuteness of hearing tested by a small watch is normal both for aërial and bone-conduction; whispering is heard at normal distance, at least so far as I could make out clearly in the room at my disposal, which was fourteen metres long. Patient assured me, moreover, that he understood every whisper of the prompter from the top gallery of the theatre. *On the other hand bone-conduction was absolutely wanting even with the ear closed for C, C', and A' tuning-forks which were all heard through the air at a distance of fifteen ctm.* I prescribed bromide of potassium, but have not seen the patient since.

The important point in this case is the great difference in the acuteness of hearing by air-conduction on the one hand and by bone-conduction on the other. This great contrast is so entirely opposed to our experience as to the diagnostic value of the absence of bone-conduction, that one might be tempted, in view of the still present almost normal sharpness of hearing through the air, to seek the seat of the anatomical disturbance and the cause of the interrupted bone-conduction for all sounds elsewhere than in the labyrinth, especially as he had never suffered from vertigo.

When the perception of sounds through the bones of the head is wanting, it is generally regarded by all experienced scientists as a reliable sign of labyrinthine syphilis,[2] especially in young persons. But in such cases the perception of sound through the air is also greatly diminished, and the deafness is very considerable; while, in our case, the acuteness of hearing was relatively still very good, indeed nearly normal, and, as the patient assured me, continued so during the two years he has suffered from tinnitus.

[1] This condition has not the least connection with syphilis. Twelve years ago I described three such cases and found that these tumors are simple hyperplastic growths resulting from irritative processes at the time at which the annulus tympanicus unites with the squamous portion of the temporal bone, and that as symmetrical growths they have a certain analogy with the double-sided bony protuberances observed in the so-called spinous pelvis. (Compare "Symetrical formation of exostoses in both the external auditory canals of man.")—ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, vol. ii., 1, page 136.

[2] Granting that the previous existence and the continuance of syphilis throughout the present condition is established by the history.

Nevertheless, if we wish to place the seat of the anatomical disturbance in the labyrinth, it is difficult to understand what kind of lesion that can be which allows such a remarkably good perception of sound-waves through the air. This would not be possible either in a simple hyperæmia, or in a serous or small-cell infiltration, or in a periostitis of the labyrinth. And assuming a change in the auditory nerve—to speak very generally—beyond the labyrinth, it is still very difficult to reconcile the great difference between perception through the bones and the air. In a central affection of the acusticus we would have to suppose a similar affection on both sides, which would be slightly increased and then remain stationary, perhaps under the influence of the various remedies. Concerning the *diagnosis of the nature* of such a change, however, we must enjoin the greatest reserve, in view of the total lack of convincing pathological and anatomical facts. In the case in question we cannot make the little that is known of diagnostic value. According to Virchow,[1] "it cannot be doubted that sometimes gummata of the brain or base of the skull involve the acusticus," and E. Wagner[2] says "but few syphiloma of the nerves have been hitherto described." Probably the Dixon[3] cases belong here. The affected nerves in one of the cases were preëminently the opticus, the oculomotorious, and the abducens of the left side, and the trigeminus of the right side. The work, which is otherwise so rich in careful observations, comprises nothing about a similar change in the auditory nerve.

SECOND CASE.—*Rapid and complete destruction of hearing, first on the left side simultaneous with a slight apoplectic attack, then on the right without it, in consequence of syphilis.*

The patient, forty-five years of age, consulted me in the beginning of July, 1880. He said that twenty years before he had been specifically infected, but after two months was fully restored, and then had been entirely well until five years before. At that time he sustained a slight apoplectic attack without loss of conscious-

[1] "Krankhafte Geschwülste." Bd. II, page 463.

[2] *Archiv der Heilkunde*, 4 Jahrgang.

[3] *Med. Times and Gazette*, October, 1858.

ness, with total permanent deafness of the LEFT SIDE, permanent subjectvie auditory sensations, and sensation of formication in the right hand and foot, which continued for a long time and then gradually disappeared. Four days before—in the night between the 4th and 5th of July—he also *completely lost the hearing of the right side* without any other appearance of disease that could have pointed to a central affection, at the same time with violent subjective auditory sensations—the ringing of bells, etc. *He has never suffered from dizziness.*

The objective examination, with the exception of the injection of the vessels on the handle of the malleus, was negative. Hearing absolutely destroyed. A course of sweating and inunction taken under the direction of Friedreich in the Academic Hospital and the use of Zittmann's decoction were entirely without result, as far as hearing was concerned; only the noises became fainter, and the patient afterward felt physically better, especially in the head. I advised him to enter a school for deaf-mutes.

The *origin* of the disturbance described can be most easily explained if we suppose the patient to have a *syphilitic disease of the vascular system.* Under the influence of this the simultaneous appearance of blood extravasations in different places[1] would not be strange, as in the first attack in the brain and labyrinth. That hemorrhages in the cochlea occur as attendant changes with hemorrhage of the brain, I convinced myself years ago in a cadaver in a case of hemorrhage in the brain.[2] In the second attack, when hearing on the right side was destroyed without the appearance of any other symptom, we must suppose an isolated hemorrhage in the cochlea from the same anatomical cause —syphilitic changes in the vessels.

If we would allow only a central lesion for each single attack, we must suppose an extravasation limited to the root of the acusticus between the outer and inner nucleus. This would certainly be a remarkable accident, which would hardly have repeated itself in precisely the same manner in one and the same patient.

[1] Or the formation of autochthonic thrombi?

[2] ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, vol. iv., page 498. Besides the cerebral hemorrhage in consequence of chronic endo-arteritis, all the cochlear convolutions on both sides showed signs of fresh and old hemorrhages.

THIRD CASE.—*Labyrinthine affection of both sides—the result of syphilis—Marked improvement after two years' duration of the trouble.*

The patient, twenty-eight years old, consulted me August 7, 1882. She was specifically infected two years ago. She is being treated at the same time by Drs. A. Weil and Kehrer for an eruption, an ulcer on the right tonsil, and a recto-vaginal fistula. She suffers from violent vertigo, constant noises on both sides, and nausea. She hears loudly spoken words. Watch, $\frac{15}{1000}$ for each side. *Bone-conduction for watch and tuning-fork totally lost.* The membrana tympani and middle ear normal.

In a consultation with Dr. Weil it was decided, because of the diagnosis of a specific affection of both labyrinths, that the patient should continue as before to take Root Laffecteur with iodide of potassium. As Dr. Weil informed me, after the vacation, the patient was relieved of her trouble by the further use of this remedy, and the recto-vaginal fistula was operated on successfully by Dr. Kehrer. Vertigo ceased, and hearing was *notably improved.* I had no further opportunity to examine the patient myself.

We can place the seat of the anatomical lesion in this case with tolerable certainty in the labyrinth, and, as there was violent vertigo, in the *entire labyrinth.* Probably the trouble was a small-cell infiltration of the lining membrane of the wall of the labyrinth, as I have described it in *Virchow's Archives,* vol. xxxix., page 313.

The case is especially deserving of notice if we compare the functional examination with that of the first case, inasmuch as in this, the third case, severe deafness went hand in hand with loss of bone-conduction, and hearing returned with the abatement of the other labyrinthine symptoms, vertigo and nausea. As to the condition of the bone-conduction when the cure was completed, I had unfortunately no opportunity to ascertain personally.

TWO CASES OF TOTAL LOSS OF HEARING OF ONE EAR FROM MUMPS.

By CHARLES J. KIPP.

TO the cases already on record I can add two others, both of which are, I think, of sufficient interest to warrant their publication.

CASE I.—*Total loss of hearing of right ear only, first noticed fifteen days after the commencement of an attack of mumps, while the patient was suffering from metastatic inflammation of the left testicle.*

The patient, a young man eighteen years of age, I saw in consultation with Dr. Chambers, of East Orange, who treated the patient from the beginning of the attack of mumps. The first symptoms of parotitis showed themselves on March 19th; both sides were affected; the attack was only of moderate severity. On the sixth day of the disease inflammation of the left testicle set in, and on April 3d, fifteen days after the mumps began, and while the orchitis was subsiding, the patient first noticed that he was deaf in his right ear. The swelling of the parotid glands had at this time entirely disappeared. No tinnitus and no vertigo were noticed at this time. He was somewhat nauseated and vomited a few times. He had no pain in his ears. Dr. Chambers, who is thoroughly familiar with ear diseases, made at once an examination of the ear and found it to be normal in appearance. There were no signs of inflammation, either in the external canal or in the middle ear. Inflation of the middle ear produced no improvement in hearing.

A week after the deafness was first noticed I had an opportunity to examine the case.

I found that the left ear was entirely normal in appearance, and its hearing power uncommonly acute.

The right ear was totally deaf. With the left ear closed as much as possible, he was able to hear words spoken very loudly, but he heard them as well when the right (deaf) ear was also closed. The tick of the watch he heard on the right side only when the watch was pressed against the mastoid process, and then he heard it in the *left* ear. Tuning-forks of different pitch were not heard when held in air in front of external meatus (with the other ear closed), but were heard from mastoid. When placed on vertex or held between teeth the tuning-forks as well as the watch were heard only in the left ear, and this result was not changed by closing the right ear as much as possible with the fingers.

The external canal was normal. The drum membrane normal in color and transparency. The light spot was of good size and in normal position. There was not the slightest injection of the vessels of the dermoid layer. The drum membrane was in normal position, and its mobility was unimpaired. The Eustachian tube was very pervious ; even slight pressure in making the Valsalvian experiment causing the membrane to move outward. The sounds on inflation through the catheter were broad and dry. Not the slightest evidence of disease of the middle ear could be discovered. The mucous membrane of the naso-pharyngeal space was still congested and somewhat swollen. There was no facial paralysis.

Since a few days the patient has slight intermittent singing in this ear, but he is not at all annoyed by it. He is not now and has not at any time been dizzy. His gait is perfectly steady. The sickness of the stomach, which was present at the commencement of the aural trouble, has passed off.

As inflation had no effect on the deafness, it was soon given up. Iodide of potassium was given for weeks ; then pilocarpine was tried, and blisters were applied over the mastoid, but all was of no avail. The ear remains absolutely deaf.

Compared with the cases on record this one differs from all the others in this, that the deafness was developed while the patient was suffering a metastatic orchitis.[1]

As to the part of the ear affected there is no doubt in my

[1] While this paper was in the hands of the printer I found the report of a very similar case observed by Henry D. Noyes, in the Transactions of the American Otological Society, 1879, page 342. In this case the ear symptoms appeared before the orchitis. Vertigo, tinnitus, and vomiting were prominent symptoms.

mind. The sudden and complete loss of hearing observed in this case can only be accounted for by an affection of the nervous apparatus of the ear. There were absolutely no manifestations of cerebral disease, and from this it is only fair to infer that the seat of the disease was not within the cranial cavity. It must therefore have had its seat in the labyrinth. And as all signs of irritation of the acoustic nerve were absent, such as tinnitus aurium, vertigo, and disturbances of equilibrium, it seems highly probable that the disease was limited to the cochlea. Nausea and vomiting were present it is true, but as these symptoms seem to have troubled the patient before the deafness was noticed, it seems probable that they were due to the orchitis. As to the nature of the morbid process in the cochlea, whether it was an inflammation with serous or hemorrhagic effusion or embolism of the cochlear artery, I shall not make a guess.

While I do not doubt that in some of the cases of deafness from mumps disease of the middle ear was present, and was perhaps the sole cause of the deafness, there is not the slightest evidence in this case that the middle ear was in the least affected during the patient's illness. Dr. Chambers examined the ear immediately after the deafness was noticed and found no signs of inflammatory disease about the external canal or the middle ear. Moreover, there was not at any time the slightest pain in or about the ear. I saw the patient a week later and found nothing abnormal about the external and middle ear, not even a trace of a former inflammation of these parts. This absence of all change in the drum membrane in this case, as well as the suddenness of the loss of hearing, certainly speaks strongly against the hypothesis that the disease did have its seat in the middle ear. Among the many hundreds of cases of recent deafness in which the tuning-fork test indicated middle ear disease in young and old people that have come under my observation, I do not think that I ever saw one in which there was not either a change in the membrana tympani or a movable exudation in the drum cavity,—and in which treatment did not produce some improvement.

As to the cause of the ear affection in cases of mumps I

have no theory to offer, but it may not be out of place here to say that an extension of the disease from the parotid gland to the ear, along the facial nerve or through the external canal and tympanic cavity, seems to me highly improbable, and that I think it much more likely that the inflammation of the parotid, the orchitis, and the ear affection are merely local expressions of the same morbid condition of the blood. Some years ago I saw a child who while suffering from scarlet-fever became suddenly blind in one eye. The examination revealed the same picture which is seen in cases regarded as embolism of the central artery of the retina. The child was free from disease of the heart, and had neither at that time nor later albumen in the urine, and recovered its health entirely, but of course remained blind in this eye. There is, it is true, no evidence that in this case an embolus really caused the blindness, but since in a few cases in which there was the same sudden loss of vision, and which presented precisely the same picture of the fundus oculi, an embolus was found in the artery mentioned, we may assume that the cause of the blindess was the same in my case. Now if such an occurrence can take place in the course of scarlet-fever, why is it not possible that in some of these cases in which only one ear becomes deaf from mumps—a disease in many respects like scarlet-fever—the loss of hearing may be produced in the same way? The very sudden and painless destruction of the hearing power observed in this case is so much like the sudden and painless loss of vision observed in cases of so-called embolism of the cerebral retinal artery, that I have thought it worth while to call attention to it.

CASE 2.—*Total and sudden loss of hearing of one ear during an attack of mumps.*

F. M., fourteen years of age, consulted me in June, 1883, for deafness in both ears. From his statement it appeared that two years before he had bilateral mumps, and that while suffering from this disease, he suddenly became deaf in left ear, and has remained so since. Neither he nor his father remembered whether sickness of stomach, dizziness, or staggering gait were present at that time, but thought that they would have remem-

bered it if such had been the case. Since then he has had neither dizziness nor difficulty in walking. Four weeks ago he contracted a severe cold in the head, and since then the hearing of the right ear has also been greatly impaired.

On examination I found that he was totally deaf in the *left* ear, the one in which the hearing was lost from mumps. Neither speech, nor watch, nor tuning-fork were heard in this ear. Placed on vertex or between teeth, tuning-forks and watch were heard only in right ear. The right ear heard tick of watch only when this was pressed against the ear. Tuning-forks were heard in air and through bone on this side.

The left ear was found in the following condition: external canal capacious and free from disease. The drum membrane was perhaps slightly more transparent than commonly, but otherwise entirely normal. There was no retraction and no impairment of its mobility. The Eustachian tube was pervious. Air entered tympanic cavity freely on making Valsalvian experiment. The middle ear was, as far as it is possible to ascertain this, in a healthy condition.

The *right ear* showed all the usual signs of an acute catarrhal inflammation of the middle ear. The drum membrane was injected and somewhat swollen, and slightly bulged in posterior half. The Eustachian tube was pervious. He had considerable naso-pharyngeal catarrh. He was treated for this in the usual way, and when last seen, a month later, his hearing was nearly normal. Since then I have not heard from him.

This case is interesting simply from the fact that two years after an attack of ear trouble leading to complete and permanent deafness of one ear, he was attacked in the other ear by a probably entirely different disease. In this case naso-pharyngeal catarrh may have existed before the parotitis developed, and the ear disease which occurred during the attack of mumps may have been a middle-ear affection. The slightly atrophic drum membrane would certainly support such an assumption, but if the primary ear trouble was seated in the middle ear, it must have caused secondary labyrinthine disease, for the deafness of this ear was complete, as was shown by the tests with the tuning-fork.

STATISTICAL REPORT OF THE CASES TREATED DURING THE YEAR 1883 IN MY POLICLINIC FOR DISEASES OF THE EAR AND NOSE.

By Dr. ARTHUR HARTMANN, Berlin.

Translated by Dr. J. B. McMahon, New York.

THE policlinic has been in existence since October, 1881, and has enjoyed a steadily increasing attendance. In the year 1881, 92 patients came under treatment, in 1882, 981 patients, whilst in 1883 the number grew to 1,188, exclusive of those who remained under treatment from the previous year.

The following forms of disease came under observation:

NAME OF THE DISEASE.	NO. OF CASES.
External Ear.	
Eczema of the auricle and meatus	13
Perichondritis of the auricle	1
Furuncles in meatus	39
Diffuse inflammation of the external ear	9
Inspissated cerumen	106
Foreign bodies	18
Fungi	1
Other diseases (1 abscess of lobule, 1 lupus of the auricle, 2 cholesteatomata)	4
Myringitis	1
Rupture of drum membrane	2
Congenital closure of external meatus	1
Middle Ear.	
Otitis media acuta	197
Swelling of the tube	108
Chronic middle-ear catarrh without perforation	34

Chronic purulent inflammation of middle ear:	
(*a*) Simple	137
(*b*) With formation of polypi	35
(*c*) With caries and necrosis	17
Sequelæ of purulent inflammation of middle ear	83
Sclerosis of middle ear	79
Otalgia	14
Injuries of the middle ear	4
Tinnitus without objective phenomena	6
Syphilis	4
Other diseases (1 otitis diphtheritica, 1 irritation of the chorda tympani, 1 tympanophony)	3

Nervous Apparatus.

Affections of the labyrinth	20
Ménière's symptom-group	9
Deaf-mutism, congenital	2
" " acquired	6
Fracture of the petrous bone	7

Nose and Naso-Pharynx.

Acute catarrh	9
Chronic catarrh:	
Simple	83
With polypoid hypertrophy	17
Nasal polypi	28
Eczematous affections of the nostrils	38
Ozæna	25
Epistaxis	6
Syphilis of nose	10
Foreign bodies in nose	3
Adenoid growths in naso-pharynx	32
Chronic pharyngeal catarrh incl. tonsillar hypertrophy	34
Syphilis of pharynx	4
Other diseases of nose (erythema, 2; acne, 4; herpes, 1; abscesses of the external nose, 2; diphtheria of nasal mucous membrane, 2; paralysis of velum, 3; malignant neoplasms, 2)	16

Unclassified Diseases.

Parotitis, 2; affections of the temporo-maxillary articulation, 2; glandular swelling in neck, 3; goitre, 4; cephalæa, 3; salivary calculus, 1; fish-bone in base of tongue, 1; idiotism, 1; trigeminal neuralgia, 1	18

The 1,188 patients presented 1,283 forms of diseases, 960 diseases of the auditory apparatus, 305 of the nose and naso-pharynx, and 18 others.

The following **operations** were performed:

Incisions in external meatus	19
Removal of foreign bodies from the ear (including one sequestrum)	19
Paracentesis of drum membrane	25
Removal of aural polypi	30
Syringing with use of the tympanum tube	9
Opening of abscesses over the mastoid process	11
Opening of mastoid process	14
Galvano-caustic operations for chronic nasal catarrh	12
Abscission of polypoid hypertrophies	16
Removal of nasal polypi	29
Abscission of adenoid growths	33
Galvano-caustic operations in pharynx	2
Abscission of tonsils with the tonsillotome	6
Removal of foreign bodies from the nose	3
Abscission of the anterior portion of the middle turbinated with the conchotome.[1]	3
Opening of glandular abscesses of the neck	4
Total	235

The ear was the seat of the operation in 127 of the 235 operations, the nose and naso-pharynx in 108.

With such an abundance of material, many points of interest claim special attention. Some individual cases have already been communicated to the Naturforscher Versammlung in Freiburg; others will be utilized in the new edition of my text-book "Diseases of the Ear and their Treatment." (Translation into English by Dr. Sinclair to appear; G. P. Putnam's Sons.—ED.) Later, I will take occasion to make further reference to these observations. For the present I shall confine myself to a separate consideration of the fourteen cases of chiselling of the mastoid process.

[1] Presented in the otological section of the Naturforscher-Versammlung, in Freiburg.

FOURTEEN CASES OF CHISELLING OF THE MASTOID PROCESS PERFORMED IN THE POLICLINIC DURING THE YEAR 1883.

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OF the fourteen cases which required the opening of the mastoid, there were four in which the mastoid disease was the direct result of acute inflammation of the middle ear. The outer surface of the mastoid process was sound in two of these four cases at the time of the operation; in the other two, abscesses and fistulas had already developed. In one of the former the suppuration travelled through the inner surface of the mastoid process, as first described by Bezold. The remaining ten cases presented complications of chronic suppuration of the middle ear, as follows: formation of sequestra in four (two adults, two children), four cases of caries in children, one case of formation of polypi in the middle ear and mastoid process, and one case of cholesteatoma in an enlarged mastoid antrum. Death resulted in two cases, in one of which facial paralysis and symptoms of meningitis had developed before the operation. In the second case the operation was proposed as a last resource, pyæmia and thrombosis being present, so that the prognosis was in the highest degree unfavorable.

Although the literature of late years presents apart from the numerous cases of Schwartze, many histories relating to the artificial opening of the mastoid, it may be allowable to enter somewhat more fully upon such of the operated cases as seem to be of special interest, whilst for the others I shall confine myself to a few remarks.

CASE I.—**Acute Inflammation of the Middle Ear with Involvement of the Mastoid Process. Chiselling of the Mastoid Process, the Outer Surface Being Sound. Cure in 7½ Weeks.**

T., clerk, æt. twenty-three. Acute right otitis media since October 4, 1883; accompanied from the beginning by very severe pain in the ear, in the mastoid region and in the right temple. Four days after the invasion of the disease a perforation of the drum membrane took place spontaneously without recedence of the distressing symptoms. The pains under the use of ice and leeches did, indeed, diminish but returned with great severity. The auditory canal was early involved in the inflammation and, in particular, the posterior wall was carried strongly forward, while the posterior portion of the drum membrane projected markedly outward. Repeated incisions, as well as instillations of alcohol, produced no improvement. The alcohol passed into the naso-pharynx. The secretion was always considerable. As the condition was not altered by the treatment, and the pains extending to the back of the neck and occiput became steadily worse, the externally sound mastoid was chiselled open on November 25th. The incision was made at the line of attachment of the auricle and at the height of the external meatus. It was necessary to penetrate about one cm. before reaching pus and granulation tissue which filled a large cavity extending forward and backward. The granulations were removed as much as possible with the sharp spoon. The bleeding which accompanied the penetration of the bone was considerable and became quite profuse during the removal of the granulations. Fluids injected into the auditory canal did not pass through the cavity. The after-treatment consisted in the introduction of a thick rubber drainage-tube, later of a lead tube, insufflations of iodoform, and carbolized injections. The painful symptoms disappeared after the operation, no febrile movement ensued, the discharge from the auditory meatus became less. During the after-treatment granulations in the cavity had repeatedly to be removed with Wolf's spoon, and the gouge was once used to widen the inner part of the canal leading to the cavity, in order to keep it open for inspection. Not till the latter part of December did injections into the cavity find their way into the external auditory canal and naso-pharynx. After this the secretion soon fully ceased, the perforation of the drum membrane closed, and the normal markings of

the membrane became gradually recognizable. The rubber drain was replaced by a lead tube. This was removed on January 9th. On January 11th, the canal left by the operation had completely closed. On January 26th, the watch was heard at 40 *cm.*, loud speech at six metres.

CASE 2.—**Acute Inflammation of the Middle Ear. Passage of Pus through the Inner Surface of the Mastoid Process; Deep Abscess in Neck. Chiselling of Mastoid Process, Outer Surface Being Healthy. Cure in 11 Weeks.**

Grigat, æt. sixty, packer. Patient who had previously enjoyed good health, was taken last June with pains in the left ear, which gradually increased and involved the whole side of the head. He sought the aid of Prof. Berthold (Königsberg), who gave him considerable relief by the use of the air-douche (tread-ball). The pain soon returned and paracentesis was performed. This again gave temporary relief, but the pain again developed and also attacks of vertigo. The patient was now sent to a hospital, where insufflations of a "white crumbly powder" were used. No improvement resulting, he came here at the wish of his family. At the first examination (August 23, 1883) a narrowing of the auditory canal and a small granulation in a perforation at the lower part of the drum membrane were observed. Small pieces were again and again removed with the snare and the sharp spoon but the pains continued. There was easy communication between the auditory canal and naso-pharynx, and instillations of alcohol, which were never unpleasant to the patient, always passed readily into the naso-pharynx.

Before he came here for treatment, the patient had already complained of pains in the region of the left sterno-cleido-mastoid, where there soon developed quite a hard swelling, slowly increasing in extent. The swelling was situated in the middle of the lateral cervical region, behind the sterno-cleido-mastoid. Applications of tincture of iodine and unguentum hydraygri proved of no avail. By the middle of September, it became evident that pressure on the swelling caused a profuse flow of creamy pus from the auditory canal, and the patient was referred to the Hedwig Hospital for the opening of the deep-seated abscess. A deep incision was made under an anæsthetic, and a drainage employed. After a stay of three days in the hospital, the patient returned and now carbolic solutions could be forced into the auditory canal

from the abscess, which was situated in the middle of the lateral cervical region, the liquid having thus passed through the abscess cavity, the mastoid process, and the tympanic cavity. The pains became somewhat less after this, but there remained a free discharge of pus from the abscess and from the auditory canal. The expectation that a cure would now result proved erroneous. The secretion and pain persisted though in a less degree. The condition of the patient deteriorated. It was a matter of surprise that the mastoid process was sensitive only in the early part of the disease, and that there never had been swelling or redness over it. On November 6th, the mastoid process was chiselled open. An incision was made in the skin at the attachment of the auricle. A considerable amount of pus escaped after the first few blows of the chisel. When the opening had been enlarged a cavity was disclosed lined with granulations. These being removed, a passage was seen in front and a large cavity behind. The granulations and the decaying bony tissue were now as much as possible removed with the spoon. No connection with the tympanic cavity or with the abscess of the neck was discovered. It was supposed that this would be established in a few days, and so the operation was not pushed further. Powdered iodoform was blown into the cavity, a thick drainage-tube inserted, and salicylated cotton used as a dressing.

On the second day after the operation, the first dressing was changed, injected fluids found their way in small quantity into the fistula of the neck, and, more freely, into the external auditory canal. For some days granulations had repeatedly to be removed with Wolf's spoon. It now appeared that fluids injected into the fistula of the neck escaped through a narrow cleft in the wall of the mastoid, situated between the anterior and posterior cavities. This cleft was enlarged with the chisel, the patient sitting in a chair, no chloroform being administered. After a half-hour's work, a canal had been made, 1 *cm.* deep, of the thickness of a lead-pencil, leading into another cavity filled with granulations. The entire procedure caused absolutely no pain, the patient submitting to the chiselling of the solid bone without moving a muscle. The parts were completely insensitive. After clearing this newly discovered cavity with the sharp spoon, a large stream of water was passed from the fistula of the neck through the opening in the mastoid, and also in a reverse direction. Later on in the after-treatment it was again and again requisite

to remove the luxuriant granulations with the sharp spoon or to cauterize them with nitrate of silver. Although the greatest attention was given to maintaining a free communication, the discharge of pus, particularly from the neck, remained at first very considerable, then gradually diminished. Toward the end of December, a thick lead tube was inserted; in the beginning of January, 1884, a thinner one. The secretion now steadily decreased, so that on January 16th, even the thin lead tube could be discontinued. In two days the opening had closed. A few days later the already shortened rubber drainage-tube was removed from the fistula of the neck, which soon healed. The process in the tympanic cavity had also in the meantime resulted in a cure with complete restoration of the drum membrane, which curved strongly forward during the Valsalvian experiment. Watch heard at 2 *cm.*, whispered speech at 1½ metres.

CASE 3.—**Acute Inflammation of the Middle Ear. Formation of Abscess and Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Cure in 4½ Weeks.**

Berghard, mason, æt. seventy-three, took sick July, 1883, with severe pain in the left ear and left half of head, accompanied by difficulty of hearing and loud roaring. Patient came under treatment on July 13th; in addition to severe inflammation of the middle ear there was swelling over the mastoid and very acute pain in the mastoid and temporal regions. Treatment consisted in applications of tincture of iodine, ice, and leeches. A small amount of secretion was evacuated by a paracentesis on July 18th. A collection of pus over the mastoid process was opened on August 3rd. No fistula was detected by the probe in the mastoid, which was not covered with periosteum. As there was no diminution of the pain in the mastoid or of the headache, the mastoid was chiselled open on August 9th, under chloroform. A fistula of the bone was discovered about 1 *cm.* behind the line of attachment of the auricle. This was enlarged forward to a considerable extent. Granulations were met at the depth of about 1 *cm.* and were removed with the sharp spoon. Iodoform was blown into the cavity. The opening was kept patent by a rubber drainage-tube, later by a lead tube. Strange to say, the pains did not cease immediately after the operation, lasting, though in a less degree, for the next fourteen days. A thin lead tube could be inserted at the end of the month. The opening had closed on September 10th.

CASE 4.—**Acute Inflammation of the Middle Ear. Formation of Abscess and Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Cure in 4½ Weeks.**

Geisler, mason, æt. thirty-four, contracted in February, 1883, an acute inflammation of the middle ear, without urgent symptoms. Four weeks after the beginning of the attack severe pain and swelling in the region of the mastoid process set in. The patient was admitted to the policlinic on March 27th. There were present a moderately large perforation in the anterior portion of the drum membrane, some slight swelling of the auditory canal, redness and swelling over the mastoid process. The otorrhœa was considerably lessened by the use of the air-douche and boric acid. The process in the mastoid went on to the formation of abscess in spite of the use of cold applications and of tincture of iodine. On April 10th, a small abscess was opened. At one spot the surface of the bone was found entirely divested of periosteum. As, despite this procedure, the swelling and acute pain persisted, the mastoid was chiselled open on April 22d, under chloroform. A longitudinal incision was made through the fistulous opening, which was situated 1 *cm.* behind the attachment of the auricle. The opening was enlarged by an incision at right angles to the former, running forward. After the removal of over a square centimetre of the corticalis, the granulations which filled the subjacent cavity of the mastoid process were removed with the sharp spoon. No connection between this cavity and the tympanum was discovered. Powdered iodoform was sprinkled in, and a thick rubber drainage-tube inserted. A salicylated cotton dressing applied. The swelling rapidly subsided and the pain ceased immediately after the operation. Fourteen days later, the opening was so much diminished in size by granulations that only a small lead tube could be inserted. The secretion was exceedingly slight. On May 18th the patient at his own wish was allowed to go to work with the lead tube in position. Closure of the opening on May 26th.

CASE 5.—**Chronic Suppuration of the Middle Ear. Formation of Abscess and Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Removal of Two Sequestra. Cure in 4 Weeks.**

Heinrich Sauer, laborer, æt. twenty-nine, has suffered since childhood from otorrhœa with marked deafness on the left side. In De-

cember, 1882, the patient after immoderate exertion was seized with a pain in the left ear, accompanied later by severe vertigo and headache, both of which persisted several months with short intermissions. In June, 1883, acute pains over the entire left half of the head developed with a gradually increasing swelling, reaching from behind the auricle to the occiput. In August, the patient noticed that a free discharge of pus from the ear occurred, whenever he pressed on the swelling. When he came to the Policlinic on August 17th, the abscess was opened by a large incision and drained. Injected fluids passed through the auditory canal. The probe when passed forward touched rough bone at a depth of about 3 *cm.* In the ear itself were found large polypi with pedicles which were approached with great difficulty, on account of the markedly narrowed auditory canal. These polypi were removed, in great part, with the snare and sharp spoon. After the opening of the abscess the subjective condition of the patient improved materially, the pains disappearing. There remained, however, a free secretion from the auditory canal and from the fistula. On November 3d, therefore, the mastoid was chiselled open. The fistula was laid bare and enlarged backward and upward ; a canal of about 1 *cm.* in depth was made before the cavity in the mastoid process was exposed, full of spongy granulations. The probe detected movable bone behind and below. In order to remove this, the canal had to be enlarged considerably. The piece removed was over the size of a bean. An equally large piece could be removed after the extraction of the first. Powdered iodoform was insufflated into the very large cavity, and a thick drainage-tube inserted. Two days later, dressing removed, the wound granulating nicely, secretion scanty. The wound-cavity rapidly filled with healthy granulations and decreased in size. At his own wish, the patient was allowed to return to work after fourteen days. By the beginning of December the fistula had fully closed.

Case 6.—**Chronic Suppuration of the Middle Ear. Formation of Abscess and Fistula in the Mastoid Process. Repeated Spontaneous Discharge of Small Sequestra. Enlargement of the Fistula with the Chisel. Removal of Granulations and of Several Small Sequestra with the Spoon. Cure in 5 Weeks.**

Kannegiesser, æt. twenty-five, post-office official. Has had an otorrhœa from childhood and has always been scrofulous (extir-

pation of glands, etc.). After a fall on the chin, five years ago, he was suddenly taken with headache, general malaise, and soon with fever. After four to six days a large swelling formed behind the ear which soon involved the whole side of the head. An incision made behind the ear fourteen days later, evacuated a large quantity of pus. The swelling, however, increased so that he was obliged to enter the "Charité," where he was operated on under an anæsthetic (presumably six incisions were made, the scars of some of which are yet to be seen over the occiput). Discharged after six weeks. Two splinters of bone were discharged by degrees with the pus, and a fistula remained three months. The otorrhœa had never ceased meanwhile, and when after about nine months pains developed behind the ear, the patient presented himself to me for aid. He refused the operation then declared necessary. His condition remained unaltered till the summer of 1883. The otorrhœa continued, a small piece of bone again had been discharged, the fistula occasionally healed, only to break open again. Three months ago the headache increased, secretion, dizziness, and anorexia had returned, and they persisted with varying intensity till September 20, 1883, when the patient came to the Policlinic.

He was operated on September 23, 1883. The integument covering the fistula was incised, and the cut enlarged posteriorly so that two large skin-flaps were formed. A large piece of the corticalis of the mastoid process was chiselled away, a quantity of inspissated cholesteatomatous pus was removed from the antrum by means of the inflexible tympanum-tube, and two small sequestra and many small granulations were drawn out. There was always free communication with the auditory canal. The course of the disease was not entirely free from fever. At night the pains in the head regularly returned; the condition improved after insufflations of iodoform, begun on Oct. 2d. The secretions became less and less, granulations had repeatedly to be removed. After a month the drainage-tube could be left off, whereupon prompt and complete closure of the opening ensued.

CASE 7.—**Chronic Suppuration of the Middle Ear, with Formation of Polypi. Abscess and Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Cavity Cleared with Spoon. Cure in 10 Weeks.**

Anna Bolz, æt. four. On Jan. 5, 1883, was taken with scarlet-fever and diphtheria. After eight days severe pains and bilateral

otorrhœa appeared. In February the secretion diminished slightly, and behind the right ear there formed a large swelling, which demanded incision. The secretion was in no way diminished, but the general condition of the patient improved considerably. The fistula remained open, and when some months later the child began to complain and vomit, the mother sought assistance in the Policlinic. Extensive caries and masses of polypi, almost filling the entire right auditory canal, were discovered, and an operation proposed. The mother, however, refused. As the headache and vomiting became steadily more severe, and high fever set in, the mother at last consented and the mastoid was chiselled open on September 23, 1883. After the antrum had been exposed, a large quantity of granulations and also a sequestrum were removed. During the after-treatment an intercurrent nephritis. Closure of the wound at the end of December. Four weeks later a small abscess developed at the cicatrix ; it was opened, and drained for fourteen days. Since then till the end of February the cure has been complete. The lower wall of the auditory canal is strongly incurved, the anterior half of the drum membrane is destroyed, in the posterior half is seen a depressed cicatrix.

CASE 8.—**Chronic Suppuration of the Middle Ear, with Perforation of Schrapnell's Membrane and Formation of Polypi. Formation of Immense Abscess over the Mastoid Process. Symptoms of Pyæmia and Thrombosis of the Sinuses. Chiselling of the Mastoid Process. Removal of a Sequestrum and of Cheesy Masses from the Mastoid and the Tympanic Cavity. Death 6 hours after Operation.**

Anna Zessin, æt. eleven. At the age of four, pain in the ear, with subsequent otorrhœa. Otherwise had been a healthy child. In June, 1882, the patient complained of severe pain in the right ear. Under chamomile fomentations and warm injections the ear began to discharge, and the pains decreased. As her condition fluctuated considerably, the patient came for assistance to the Policlinic in Aug. 14, 1882. A small perforation in Schrapnell's membrane, immediately over the short process, was discovered, though concealed at first by a small polypus projecting through it. After this had been removed, and the pedicle cauterized, the secretion did not diminish, in spite of several months' treatment with alcohol and cauterizations of the granulating border of the per-

foration. In July, 1883, the patient again discontinued treatment after the perforation had been closed by a polypus growing through it. On October 17th, she again presented herself, having been confined to the bed for fourteen days with severe pains in the head and violent fever and chills. There developed now a marked œdema of the entire right side of the face, especially of the lower lid, and a swelling behind the ears of almost the size of a goose-egg, from which an incision evacuated an immense quantity of very fetid pus, containing some air bubbles. It was impossible to discover any communication with the ear. The subjective condition improved, but on October 19th, toward evening, a severe chill came on, with pain in the head and violent emesis. On the 20th, the patient fell into a pretty deep stupor, and the granulations assumed a discolored appearance. Her condition improved after injections of a weak carbolic solution through the tube, and inflations with air. On October 23d, there was communication between the ear and the wound-opening. On the same evening she had another chill, violent headache, and vomiting. This troublesome condition having lasted till the morning of the 24th, the mastoid was chiselled open at 1 P.M., in narcosis, and a sequestrum the size of a pea, some granulations, and, by means of the tympanic tube, a large quantity of cheesy pus were removed. After waking, the patient felt much better, chatted again, but complained of thirst, and suddenly, at 5:45 P.M., of severe earache. After a short time she turned over on account of marked dizziness and slept quietly. She died about ten minutes later. A gradually increasing ptosis of the right eye had been noticed since noon. No convulsions. Autopsy refused.

CASE 9.—**Chronic Suppuration of the Middle Ear. Formation of Abscess and Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Cavity Cleaned with Spoon. Cure in 6 Weeks.**

Gretchen Jakabboursky, æt. five. For one and three fourth years bilateral otorrhœa following scarlet-fever, persisting on both sides with varying intensity. As a sequel to a light laryngeal diphtheria in the beginning of September, 1883, appeared severe pains and profuse discharge from both ears. After about eight days a large swelling with violent pain began to form in the region of the mastoid process, the discharge remaining as profuse as ever. On September 19th, incision and drainage. As the swelling in the neighborhood of the wound did not diminish, and as there

was considerable infiltration, especially of the posterior lip of the wound, with no lessening of the headache, the mastoid was chiselled open on October 8th. After the operation no communication with the ear was found, but when a considerable quantity of inspissated pus and granulations had been removed, the swelling around the wound decreased and the patient's general condition improved. On November 1st another attack of diphtheria (the whole pharynx was white), and later a renewed profuse discharge. On November 8th a small splinter of bone came away from the wall of the wound, and since then there has been communication between the wound and the auditory canal. The wound now diminished rapidly in size ; in the latter half of the month the lead tube was left off, and complete closure and cicatrization ensued. The discharge from the ear had meanwhile also ceased, and had not returned at last examination (in the beginning of February). There remained a perforation involving the anterior half of the drum membrane.

CASE 10.—**Chronic Suppuration of the Middle Ear, with Formation of Polypi and Frequent Abscesses in the Mastoid Process. Chiselling of the Mastoid and Removal of Contents with Spoon Done Twice. Cure with Persisting Cicatrized Fistula in the Mastoid Process 3 Months after the Last Operation.**

Marie Jorgs, æt. four. Has had a right-sided otorrhœa since one and a half years old. One year ago, after a fall on the head, an abscess formed behind the ear. The patient was treated in the Charité for four months, when the abscess was opened and a piece of bone removed. The wound behind the ear healed. The discharge from the middle ear persisted. The patient presented herself at the Policlinic on June 10, 1882. A few days previously an abscess had formed over the mastoid, and had opened spontaneously. On examination the external meatus was found to be filled with polypi. In probing the fistulous opening over the mastoid process, a fistula in the bone with rough walls was discovered. No communication found with the auditory canal. There were febrile symptoms and severe pains. On June 24th the bony fistula was enlarged under chloroform. After about six weeks, cure with a deeply depressed cicatrix. More than a year later the patient returned for treatment. Fever, acute pain, and swelling in the mastoid region had developed. The swelling soon terminated in an abscess. On August 10, 1883, a second operation.

Chiselling, removal of granulations with the spoon, and of cheesy masses from the mastoid cavity with the tympanum-tube. General condition at once improved. The healing process was very slow. In the middle of November there remained a large fistula opening directly behind the attachment of the auricle, extending one half *cm.* into the bone and completely cicatrized. No discharge whatever from the middle ear.

CASE 11.—**Chronic Suppuration of the Middle Ear. Formation of Fistula in the Mastoid. Enlargement with Chisel. Clearing with Spoon. Cure in 6 Months.**

Karl Krause, æt. two. Healthy child. At the age of one year, without previous otorrhœa, a large swelling developed in the region of the left mastoid process. In the Augusta hospital an operation on the mastoid was undertaken in August, 1882, which was followed by a decided improvement in the patient's already much debilitated general condition. The wound did not heal. The mother noticed that the ear began to run after the operation. In January, 1883, another marked swelling showed itself behind the mastoid process, so that on the 25th of January the patient came to the Policlinic. The fistula behind the ear communicated with the auditory canal, as shown by the probe. The canal was much swollen, filled with granulations. The entire mastoid region was the seat of an inflammatory swelling. On January 31st the fistula was enlarged under chloroform, and the granulations removed with the sharp spoon. In a few weeks the wound closed, but opened again repeatedly, till iodoform was dusted in, when a rapid and permanent closure was obtained. After the healing process was complete there was a deep depression on the posterior wall of the auditory canal. The drum membrane was entirely preserved but showed a uniform whitish opacity. Hearing does not seem to have suffered. The hearing was perfect at an examination made in the middle of February, 1884.

CASE 12.—**Chronic Left-sided Suppuration of the Middle Ear with Formation of Polypi and Caries, Discharge of the Necrosed Malleus, Facial Paresis, Meningitic Symptoms. Enlargement of a Fistula, Clearing of the Cavity with the Spoon. Death 8 Days after Operation.**

Selma Balzer, aged one year ten months, came to the Policlinic for treatment on March 30, 1883. It was stated that the left-sided otorrhœa had followed vaccination. In the beginning of

October, an abscess had formed behind the ear, and an operation was done for it in the Lazarus Hospital. The child remained in the hospital two months, the opening behind the ear not healing. Toward the end of December the child was again admitted to the hospital but now only poultices were employed. The opening was covered with adhesive plaster and the child, it is stated, was discharged as cured. After the removal of the plaster there was a continued discharge of pus from the fistula. When the patient came under our treatment on March 30th, there was slight facial paresis, the child was very restless, cried much, particularly at night-time, vomited repeatedly, had a poor appetite. The inner half of the auditory canal was filled with granulations, after the removal of which a small stream of fluid could be passed from the fistula of the mastoid into the auditory canal. While syringing on April 2d, the carious head of the hammer came away. The symptoms improved temporarily, to become soon worse again, the facial paresis being more marked, so that on April 6th, the fistula was laid open, the outer table of the mastoid removed with a chisel, and the cavity emptied of a large mass of granulations with the sharp spoon. Despite all this, marked meningitic symptoms developed, convulsions supervened, the child became comatose and on the 15th died.

CASE 13.—**Chronic Suppuration of the Middle Ear, with Formation of Fistula in the Mastoid Process, Masses of Polypi of Fourteen Years' Standing in the Auditory Canal and in the Mastoid, Projecting from the Fistula in the Latter. Enlargement of the Fistula with the Chisel, Removal of the Polypi with the Snare and Spoon. Treatment Discontinued before Completion of Cure.**

Matthias Teuchner, from Schwetztkan in Posen, saddler, æt. nineteen. Came to Policlinic for treatment May 2, 1883. When five years old an abscess formed over the mastoid process as the result of inflammation of the left ear; the abscess was opened by a barber; the wound did not heal. Next year he went under regular medical treatment for over a year; and it seems that even at that time polypi were removed from the ear. Four years ago the patient was in Breslau under medical care, again two years ago in Lissa for a longer time without any alteration in his condition.

On examination the auditory canal was found filled to its mouth with numerous large polypi; one half *cm.* behind the line of attachment of the auricle was a cicatrized opening the size of a

goose-quill, from which projected a polypus the size of a bean. After the removal of such polypi as could be reached in the fistula and in the auditory canal with the snare, a large vertical incision was made under chloroform through the fistulous opening and a broad canal carried into the cavity of the mastoid process. By the aid of the snare and sharp spoon a great number of granulations were removed from the cavity. The introduction of a thick rubber tube kept the canal open for the time, so that free inspection was possible. During the after-treatment, fresh granulations had frequently to be removed with the snare and spoon. Meanwhile the size of the cavity diminished, so that it was to be hoped that things would progress to a perfect cure. When in the beginning of July I was obliged to leave Berlin, the patient declined further treatment, so with regard to the further progress of the case no information can be had.

CASE 14.—**Chronic Suppuration of the Middle Ear with Formation of Fistula in the Mastoid Process. Enlargement of the Fistula with the Chisel. Removal of Cheesy and Cholesteatomatous Masses. Cure in 10 Weeks.**

Kadack, turner, æt. twenty. When two years old contracted an otorrhœa after scarlet-fever and measles. The discharge from the ear has been incessant. There was no pain till his fifteenth year. About this time an abscess developed behind the right ear, with fever and severe pain, and was incised by the physician in attendance. The opening healed in four weeks. After two years the cicatrix broke down and since then he has had a fistula discharging pus in small amount. On January 19, 1883, the patient came for treatment to the Policlinic with distressing pain behind the ear and in the neck, marked deafness, profuse discharge of pus from the auditory canal and the fistula, sleepless nights and general malaise. On examination the external meatus on the right side was much narrowed at its inner half by a decided projection of the posterior wall. Cheesy and membranous masses were removed with difficulty from the depth by the aid of the syringe and hooked probe. On January 21st the fistula was laid open under chloroform, the corticalis chiselled away and now a large quantity of pus and cholesteatomatous masses were removed from the cavity in the mastoid and from the tympanic cavity. There was free communication between the cavity in the mastoid and the auditory canal. Iodoform was dusted on the

wound. A rubber tube was inserted for some days, then one of lead. The pains disappeared after the operation and did not return. For six weeks patient was unable to work. After resuming work he carried the lead tube for four weeks till the canal became very small and the discharge was reduced to a minimum. After the closure of the fistula the drum cavity was repeatedly cleansed by the aid of the tympanum-tube, without, however, bringing away any quantity of secretion. Although the drum membrane in the other ear was destroyed and there was marked deafness the patient was called into the military service last autumn. After three weeks spent in the hospital he was dismissed as unfit for service. In January, of the present year, he again presented himself to us ; the discharge was trifling, the pains had not returned.

Having now communicated the cases operated during the last year I would take the liberty to present a short general review of my practical experience, utilizing also my former observations.

So far as concerns the choice of the point of operation I would lay down this principle :

The incision of the skin and the opening of the bone should be practised at the line of attachment of the auricle or, at least, immediately behind it.

In two cases (1 and 2) of the entire number the operation was performed on the healthy surface of the mastoid process. In both cases the skin incision was made at the line of attachment of the auricle and the mastoid was opened directly beneath this. In both cases the collection of pus was reached at a trifling depth. In the other cases with formation of fistulas it likewise proved most judicious so to incise the skin that the bone beneath the line of attachment of the auricle or immediately behind it should come into the region attacked by the chisel. It did not seem advisable to carry the operation-canal further backward on account of the danger of injuring the transverse sinus. According to the results of examinations of the cadaver already communicated by me,[1] and which are essentially in accord with those of Bezold and others, a sharp forward curve of the

[1] *Langenbeck's Archiv für Chirurgie*, Bd. xxi.

transverse sinus toward the posterior wall of the auditory canal is very frequent. In 100 temporal bones, the shortest distance between the sigmoid fossa and the posterior wall of the auditory canal, amounted in forty-one cases to 1 *cm.* or less, in one case to 5 *mm.*, in five cases to 6 *mm.*, and in six cases to 7 *mm.* The average distance was 11.5 *mm.*, the maximum 19 *mm.* The danger of wounding the transverse sinus is best seen on horizontal sections, such as I have shown in my work on "Diseases of the Ear, etc."[1]

As we can not foretell whether we shall, in operating, chance upon a sharp curve of the transverse sinus, such a possibility should always be borne in mind. Those who are familiar with the anatomical relations of the parts, will, therefore, avoid the use of drills or trephines, such as are employed by many physicians. When, in using such an instrument, the sinus is chanced upon, an injury to it is inevitable, whereas, in the operation with the chisel, as the ground is kept clear for inspection, we can recognize the danger in time and avoid it. In the operation, special attention should be paid to the fact that the more the sinus projects forward, so much the nearer does it approach the external surface of the bone. To this I have previously drawn attention. Accordingly when a sinus is markedly curved forward we reach it at a trifling depth.

As for the danger of penetrating into the middle cranial fossa, I hold to the principle previously laid down by me that the operation-canal should not extend higher than the level of the upper wall of the auditory canal. My anatomical investigations have shown that the floor of the middle cranial fossa is not infrequently separated from the upper wall of the auditory canal by only a thin long lamella, and lies but a little above it, which state of affairs I have described as the low position (Tiefstand) of the middle cranial fossa. When I operated on the cadaver after the manner of Buck (ARCH. OF OPHTHAL. AND OTOL., vol. III, p. 212), who sets the drill a little above the line of the external canal and penetrates inward, and a little upward and forward, I

[1] Second edition, p. 117.

penetrated the middle cranial fossa with the drill in three cases out of one hundred.

In operating, the skin incision and the bony canal should be made so large that a free inspection of the wound-cavity may be possible during the after-treatment. In this way it becomes easy to remove pieces of bone which become detached later. Moreover we can (and I consider this of the utmost importance for a complete and permanent cure) remove remaining or luxuriant granulations with the sharp spoon or with caustics. In order to maintain the passage open for after-treatment, rubber tubes are inserted immediately after the operation, to be replaced later by thick, and still later by thin, lead ones. These lead tubes can be easily prepared by rounding one end of a small piece of tube with the knife, and giving to the other end a funnel shape by splitting it and bending the two halves apart. The advantage of the lead tube over the lead nails is, that through the former the secretions can pass while by the latter their discharge is impeded.

The operation-canal must be kept patent until such time as the wound-cavity has diminished in size concentrically by the development of sound granulations. Soft granulations are removed as above mentioned, or are caused to shrink by cauterization with the nitrate of silver.

For complete removal of old retained secretions or cholesteatomatous masses in the mastoid process, we find it impossible in many cases to dispense with the inflexible tympanum-tube, which I have recommended for cleansing the drum cavity and its recesses.

To prevent inflammatory reaction after the operation, the covering of the walls of the cavity, and of the canal in the bone, with powdered iodoform has proved to me of most avail. In none of the operated cases did inflammatory reaction ensue. With the existence of acute symptoms before the operation, there followed in all cases an immediate recedence of the symptoms and a surprisingly rapid cure, which, I think, should be attributed to the employment of the iodoform.[1] Both fatal cases may be ex-

[1] In one of these operated cases, a patient with acute inflammation of the middle ear and involvement of the mastoid process, the mastoid was chiselled

cluded from consideration here, as in these the operation was done at a stage of the disease when a favorable result was not to be counted on as the symptoms of cerebral disease had already developed.

In the use of the iodoform there is a circumstance upon which, possibly, the favorable effect of the remedy depends—namely, that the iodoform forms with the underlying tissues a soft, firmly attached crust; indeed, it is impossible to get a good view of the wound-cavity until after some days, when the crust has come away of itself or has been removed. By this crust-formation, on account of the scanty secretion, we can leave the first dressing unchanged for two or three days.

A strange observation particularly claims our attention in the above histories, the entire freedom from pain in cases 1 and 2 on enlarging the passage through the bone with hammer and chisel during the after-treatment. In both cases this was done with the patient sitting in a chair. In the second case it was necessary to chisel for half an hour in order to make the canal sufficiently wide and deep. This was done, to my great astonishment, with absolutely no pain.

When we consider, on the one hand, that the artificial opening of the mastoid process in acute, as well as in chronic, diseases leads to a prompt and perfect cure, and that the operation must be regarded as entirely free from danger; and on the other hand, the often very tedious, incomplete recoveries accompanied with severe functional disturbance, which now and then result from conservative treatment, we must decide in favor of the former plan; so much the more as under the conservative method there is always danger during its course of the extension of the disease deep into the mastoid. Again, in the chronic forms we are frequently unable to decide whether or not sequestra exist, which can only be removed by an operative procedure.

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open on Feb. 10th, the perforation of the drum membrane had closed on the 13th, the lead tube was removed on the 18th, and on the 23d, the patient, at his own request, returned to work with a small superficial granulating wound.

CASE OF CHRONIC PURULENT INFLAMMATION OF THE MIDDLE EAR GIVING RISE TO INTRACRANIAL DISEASE—DOUBLE OPTIC NEURITIS—PERFECT RECOVERY.

By Dr. JOHN F. FULTON, of St. Paul, Minn.

UNDER what condition the mastoid process should be opened is by no means a settled question. Although the progress of otology during the last few decades enables us to decide the question with much greater precision than could have been done a few years ago; yet it happens quite frequently that cases of middle-ear trouble come under our observation whose symptoms are so obscure and ambiguous that the best otologists will disagree as to the propriety of trephining the mastoid. This being a question of such great practical importance, the most experienced aurist will not fail to welcome the report of all cases which throw any light on the subject. When disease of the middle ear extends to the mastoid cavity it always excites our serious apprehensions, but when it extends to the cranial cavity it becomes so grave that but few cases of recovery have been reported, and with some of those the diagnosis is doubtful. Recent clinical reports however, show that intracranial disease as the result of chronic suppurative inflammation of the middle ear is not so rare as was at one time supposed, and that such cases are not absolutely hopeless. The following case which I report at the request of Dr. Knapp, and to whose skilful and conservative measures its successful termination is largely due, while it illustrates some of the subjects hinted at above, will be interesting and instructive, I hope, to my professional brethren, as it has been

to those under whose observation it has come. It gave me much anxiety on account of the obscure nature of the symptoms, and the different opinions given by the various specialists whom the patient consulted as to the proper means to be resorted to for the relief of this very dangerous malady.

Mr. J. H. Hiland, of this city, first came under my care on the 10th of May, 1883. He gave me the following history of his case: In 1877 some hardened wax was removed from his R ear by means of an instrument; his ear bled somewhat at the time. This was followed by a severe acute inflammation of the middle ear with considerable discharge. For this trouble he was treated by Dr. Francis Atwood, of this city. Not appreciating the danger of the suppurating process, the patient neglected himself, and allowed the disease to continue for a year. In 1878 he put himself under the care of Dr. Bartlett, of Milwaukee, who removed a polypus from the ear, and also succeeded in stopping the discharge in six weeks. After this the acuteness of hearing remained good and he had no more trouble until April, 1883, when the ear began to discharge again after he had suffered with pain for a few hours. At the time of my first examination I made notes as follows: Mr. H., aged thirty-six, a prominent railroad official. He was pale, and had an anxious expression. Has trouble in fixing his mind on his business. The canal filled with a whitish inoffensive discharge, which was carefully removed by means of absorbent cotton. The epithelium of the external canal was macerated and swollen, so that it was difficult to study the condition of the drum. Perforation of the upper posterior quadrant. It was quite red, as well as the adjacent part of the external canal. The perforation of the membrana tympani as well as the tympanum was the seat of granulations. The watch could be heard only on contact, and the tuning-fork heard best on the R side. There was nothing abnormal about the mastoid region or the glands or muscles of the neck. He was careless as to his treatment, reported at the office only a few times, and I heard nothing more of him until he returned from Dr. Bartlett, of Milwaukee, having been under his care one month.

He came under my care again on the 25th of August. The trip on the cars made him much worse. Travelling on the cars always had this effect. He travelled quite frequently to Chicago, St. Louis, etc., during the next six weeks, and always re-

turned with a relapse of his aural trouble. At this time (the 25th) I found the tissues of the external canal much swollen; the auricle stood out from the head. Some swelling in front of the tragus. There was no trouble with the mastoid or with the sterno-cleido-mastoid region. He was suffering considerable pain about the ear. I treated these acute symptoms by washing out the ear with a saturated solution of boracic acid and the instillation of atropia and morphia to relieve the pain. After a few days the swelling had subsided, and I began treating him with the boracic powder (prepared by Wyeth & Bro.) in the usual way, the canal being carefully cleansed before each application with the absorbent cotton. No syringing was allowed. Each appliction of the powder was followed by marked increase of the discharge and decided reaction. The patient remarked that other aurists had had the same experience, and he rebelled against its use. I then resorted to burnt alum and iodoform as recommended by Dr. Buck. It was applied directly to the granulations in the tympanum. This treatment diminished the discharge, and at times the patient seemed perfectly cured; but he was very careless—a hard worker and quite ambitious—so it was impossible to keep him under control. Pain annoyed the patient quite frequently; it extended nearly along to the region of the R. eye and frontal sinus. It was *always* relieved by cleansing the ear. The patient noticed this, so that he would come to my office to have the secretions removed whenever he suffered pain. His general health began to fail, and he complained that it was not easy for him to fix his mind on his business. During the latter part of September he showed marked signs of rapid improvement. He made his last visit before his acute illness on the 25th. The discharge had ceased; he suffered no pain; was buoyant in spirits; his trouble seemed to be at an end.

On the evening of September 30th I received a message to call and see him at the earliest possible moment. I found that he had taken a drive in a strong bleak wind without an overcoat, and had neglected to put the cotton in his ear that he was in the habit of using. He was suffering great pain, which was referred to the R. eye; the conjunctiva of this eye was injected and there was some lachrymation. I filled the external canal with hot water, and ordered this to be repeated a number of times, and prescribed morphia to relieve the pain. This symptom was removed in a few hours, and *never returned during his acute trouble.*

Oct. 1st.—Nausea and vomiting had started in during the night. Temp., 103½°; pulse, 100; a well marked *hectic flush* of the left cheek. The mastoid and sterno-cleido-mastoid regions perfectly normal. Although most carefully examined many times, there was never any redness or tenderness or swelling of this region. The most painstaking investigation failed to detect any evidence of dead bone. I enlarged the opening in the ear drum, and passed a delicate probe in all directions, but with negative results. Dr. Hand, of this city, was called in consultation, and took charge of the constitutional trouble. Bromide, aconite, and quinine were ordered.

Towels run out of boiling hot water were frequently applied to the ear in the hope of re-establishing the discharges, and it was washed out with carbolized hot water.

Oct. 2d.—Dr. Hand, Dr. Chas. Smith, and myself in consultation. It was the opinion of all that operative interference was not indicated, and to continue the expectant treatment. The patient was extremely low. Nothing could be kept on the stomach, so stimulant and nutrient enemata were ordered. These were continued for several days. The temperature 105¼°, pulse 120. Hectic flush well marked, No pain or any symptoms referred to the ear. Several times during the afternoon the patient complained of "chilly sensation," *but there never was a marked rigor.* I was called a number of times through the day to see the patient by the anxious wife, saying that "he was going into a stupor." I found him somewhat lethargic, but he could always be aroused, and then would always give intelligent answers.

Oct. 3d.—On the morning of this day the case seemed most hopeless. Temp., 104½°. The shallow labored respiration; the rapid, feeble pulse; the deep, hectic flush; the cold, clammy extremities, all indicated that the end was not far off. We gave a most unfavorable prognosis. No new ear symptoms, except that a slight discharge showed itself. Some small lumps of mucous and epithelium removed; no odor, no pus. Treatment continued. Patient was supported as much as possible by stimulating enemata. On making my usual visit during the afternoon I thought I detected very slight abnormal tenderness behind the auricle, and the advisability of opening the mastoid was seriously thought of, but every thing seemed dark, so it was decided "to cast anchor and wait for more light." The morning came, and with it the light.

Oct. 4th.—The patient seemed to have taken a turn for the

better. The discharge was more profuse and slightly offensive. The succulent mucous membrane of the middle ear projected through the opening of the drum, and there was marked pulsation of these tissues, which continued for several days. The stomach began to retain food. The temperature had gone down to 102½°.

Yet the patient was by no means out of danger; his condition was quite critical, and the question of opening the mastoid still debatable ground. So Dr. Jones of Chicago was called in consultation. He arrived on the following morning, Oct. 5th. He made a most careful examination. He agreed fully with the attending physicians in carrying out the expectant treatment, and did not favor opening the mastoid. He made some valuable suggestions as to the local treatment, such as the injection of astringent and antiseptic solutions into the ear, and the application of cantharideal collodion behind the ear. From this time on the convalescence of our patient was perfectly satisfactory.

The nausea and vomiting ceased: very little if any headache; and the temperature came down to normal. Some dizziness. The digestion became good, and strength returned rapidly. In a few days I began the use of alcohol (95 %), to contract the flabby skin of the external canal, and the relaxed mucous membrane of the tympanum. It had the desired effect. The discharge ceased nearly altogether. Only a slight amount of moisture could be found in the canal at his morning visits. There was considerable tenderness of the bony portion of the canal, which had existed for some weeks, there being a periostitis of the part. It remained abnormally red up to time that Mr. H. started for Chicago and New York. The optic-neuritis, which will be described further on by Dr. Knapp, was first noticed on the 5th of October, for which trouble he was taking iodide of potash. This was the only form of eye trouble noticed. No dilatation or contraction of pupils. No ptosis. No strabismus at any stage of the disease. The patient was subject to attacks of acute pharyngitis, for which I ordered an astringent spray. I ordered him South to spend the winter, fearing that our winter would be too severe for him.

He was called to Chicago on important business, and left St. Paul Oct. 25th. Before going South I asked him to consult some of the New York specialists. He reported at Dr. Knapp's office Oct. 25th, from which date Dr. K. has kindly sent me his notes, viz.:

"*Oct.* 24, 1883.—I found him a robust man, with a slightly yel-

lowish complexion; the expression of his countenance indicating exhaustion and mental depression. There was no abnormity in the mastoid region, nor in the skin or muscles of the neck. There was moderate purulent, inoffensive discharge from the right ear. The watch was heard on application to the ear and bone, ordinary voice at the distance of 10′ (V = $\frac{10}{10}$). The tuning-fork test was normal. The innermost portion of the posterior wall of the auditory canal was red, bulging, hard in its anterior and boggy in its posterior part, tender everywhere when touched with a probe. The membrana tympani was perforated in its posterior part; the mucous membrane of the drum cavity succulent, but not projecting through the perforation in the drumhead. The *Mt* of the left ear was slightly red in the region of the folds and handle. *h* = $\frac{12}{24}$; V = $\frac{20}{20}$. Catarrhal swelling of naso-pharyngeal mucous membrane.

"The ophthalmoscope revealed distinct optic-neuritis in both eyes, more pronounced in the left than in the right. It was more marked in this case than in any other that I have seen, consecutive to ear disease. The disks were swollen, reddish-white, with white radiating streaks. The swelling encroached $\frac{1}{4}$ P. D. (papillæ diameter) on the adjacent retina, and then fell abruptly—the regular choked disk. S = $\frac{20}{20}$ and F complete on both sides. The patient complained of pain over the whole right side of his head, and a tendency to dizziness. His pulse and temperature were normal. I ordered him rest, instillations of warm boracic-acid water, gentle syringing of the ear with the same solution three times daily, wiping the ear with absorbent cotton, and filling it with impalpable boracic acid-powder after each syringing; alum gargle.

"*Nov. 2d.*—Patient has felt tolerably well. The whitish discoloration and swelling of the optic disks have diminished. Treatment continued.

"*Nov. 5th.*—Was nauseated once after eating hot cakes.

"Prescribed instillations of an over-saturated solution of boracic acid in a fifty-per-cent. solution of alcohol, to diminish the discharge and contract the skin at the inner end of the auditory canal and the mucous membrane in the drum cavity.

"During the next fortnight the condition of the patient varied. There was dizziness occasionally, and pain in the right side of the head quite frequently. The mastoid region was neither swollen nor tender to the touch. The bulging of the posterior-innermost

part of the ear-canal persisted, and was, at times, even more marked than when I first saw the patient. In one place, a small hard point was felt by pressing with the probe on the bulging skin, as if a small piece of bone were projecting. Politzer's inflation doubtful. On catheterization, a dry sound was heard, no air escaping, yet the posterior upper part of drumhead was moist, and, with a probe, the bone was readily felt through a thin layer of very soft tissue. Optic-neuritis in both eyes slowly but steadily diminishing. Pharyngeal mucous membrane less swollen and red.

"My opinion was, that there had been severe purulent otitis media, with extension to the mastoid cells and perforation of the inner and anterior surface of the bone, the pus penetrating into the cranial cavity and escaping through the tympanic cavity, possibly also through a perforation in the posterior wall of the auditory canal. Symptoms of thrombosis and pyæmia being absent, the general condition of the patient, and especially the optic-neuritis, being improving, I did not think an opening of the mastoid to be imperatively indicated. Yet the presence of optic-neuritis, the more or less constant headache, and the occasional spells of dizziness and nausea, clearly indicated that mastoiditis interna was still present, and that the inflammation had extended into the cranial cavity. I decided to incise the bulging part of the posterior wall of the meatus, and with a sharp spoon scrape the surface of the bone, in order to remove necrosed particles or to establish or dilate a communication with the mastoid antrum, if the bone should prove carious. As the case, however, was still critical, and it was questionable whether opening the mastoid immediately behind the auricle would not be the safest and most efficient treatment, I asked the patient to obtain the opinions of Drs. C. J. Kipp and C. R. Agnew. Both physicians examined the patient carefully, and each of them sent me a written opinion, which not materially differed from my own.

"*Nov.* 20th.—I incised the bulging soft parts of the posterior wall of the auditory canal, and scraped the bone with a sharp spoon. Some pus was liberated, but the bone was neither rough

nor soft. I ordered the ear to be cleansed several times daily with a one-half-per-cent solution of carbonate of soda and protected with absorbent cotton.

"No special reaction followed the operation. The patient gradually felt better. The discharge ceased. Headache, some dizziness, and a feeling of lightness in the head occurred still on certain days, while on others he was completely free from them. Rest and strict diet always had a good effect on his condition, whereas imprudence, bodily exertion, and even driving in a closed carriage, were mostly followed by a return of the above symptoms. I was encouraged to continue the mild, more or less expectant, treatment of the case, and decided to abstain from further and more extensive operative interference, chiefly by the improvement of one symptom—the steady diminution of the optic neuritis. Only once during all the time the patient was under my observation, I found the neuro-retinitis worse, that was the day after a ride, unusually bodily exercise, and some indulgence at the dinner-table.

"At the beginning of December the recovery had so far progressed that the patient could fairly be thought convalescent and out of danger. Yet, to avoid a relapse, I advised him not to stay in New York any longer, much less to return to the severe winter climate of his home, but to spend one or several months in a Southern State. On the 10th of Dec., 1883, he left for Aiken, S. C., showing the following condition:

"Pharynx almost normal. Pulse 68, Temp. normal. At times still some dizziness; slight pain in side and back of head. Appetite and general condition good. Ear-canal narrow, posterior wall still bulging, some swelling also in superior and anterior walls, *h* R $\frac{1}{24}$, L $\frac{18}{24}$; Tuning-fork normal, from vertex stronger on right than on left side. *V* R $\frac{20}{60}$, L $\frac{20}{20}$. Politzer doubtful. Catheter gives a dry inflation sound. Optic disks almost normal. Acuteness and field of vision normal.

"*Jan.* 22, 1884.—The patient came again to New York to consult me. He looked healthy and cheerful, and was greatly pleased with the progress of his convalescence in Aiken. Yet, he was not cured. The discharge had ceased a week after he had left New York. His appetite and sleep were good, but of late he had had some headache, chiefly on the vertex; some dizziness and nausea every now and then, and even for five or ten minutes at times a feeling of weakness in his limbs. The posterior part of the meatus

still prominent, with a point feeling like cartilage when pressed upon. The relief and color of the *Mt* are fairly normal, except in the posterior-upper part, where there is a depression from a former perforation. The ear-canal is of normal width, not tender to the touch in any place. Lower part of bony portion red, $h = \frac{1}{24}$, $V = \frac{20}{60}$. Left ear, $h\ \frac{18}{24}$, $V = \frac{20}{20}$. *Mt* normal. Tuning-fork from forehead normal in both ears. Acuteness of vision $\frac{20}{20}$ in each eye. The optic-neuritis has disappeared, the arteries are small, but the optic disks not white.

"I advised the patient to return to Aiken and complete his recovery before he returned to his business—railroad work in St. Paul. He did so, and about two months later I learned from Dr. Fulton that he had returned perfectly cured. H. K."

Mr. H. returned to St. Paul on the 21st of March, and came to consult me on the 22d. He had continued to improve as long as he remained in the South, and felt so well that he could not stay away from his work any longer. He gained much flesh; was strong, well, and happy. Had taken a slight cold on his journey home which showed itself in the form of a mild pharyngitis; this soon yielded to an astringent spray. He had no pain except after being fatigued; there was a sense of weight referred to the occipital region. He had used his eyes a great deal for reading, but suffered no especial inconvenience; S, both eyes, $\frac{20}{20}$. The ophthalmoscope showed that the optic-neuritis had disappeared completely, the outlines of the disk perfect, no evidence of atrophy. I found the *R.* ear in the following condition: No swelling of the walls of the canal and no tenderness. The dizziness and pain have disappeared. The upper part of drumhead still depressed, and this depressed part is red, otherwise this membrane is normal. Acuteness of hearing $\frac{8}{24}$. Tuning-fork heard still better on this side. His ear is in the same condition at present.

I allowed the patient to return to work in a few days after returning home. He came again in a few days much alarmed about himself. He had lost confidence in his mental capacity. He feared to talk to his friends, thinking that they would detect his "mental weakness." These thoughts seemed to depress and discourage him deeply. He avoided his R. R. associates fearing that his mental infirmities would be detected and it would injure his standing. I never knew a man more keenly sensitive on any subject. This continued for some time so we feared that it would

not be possible for him to continue his work. I assured him that the trouble was only functional and no indication of organic trouble. Finally he regained confidence in himself, increased his work from day to day. I find that he is now able to do as much work as ever. His general health is perfect, and his ear gives him no trouble. He has received no treatment since his return except now and then an inflation of the ear. Thus terminates in a most satisfactory manner the history of a most remarkable case.

Remarks.—It is not likely that those who follow the clinical history will fully appreciate its embarrassing and doubtful features. It is extremely humiliating to think that you have neglected to perform your surgical duty in any case. The great question to be decided in this case was: Should the mastoid be opened? Would that have been a safe or justifiable operation with the obscure symptoms met with? My answer to the question was in the negative, after having carefully analyzed all the symptoms and the condition of the patient. Only at one time in the history of the case was there any indication of a septic accident, at which time it was feared that there might be a hidden point of suppuration some place in the temporal bone but that it was impossible to diagnose its location. It was also quite evident that the inflammatory process had reached the cranial cavity and had most probably started up a basilar meningitis. It did not seem to me likely that the disease had extended through the mastoid, but through other channels. With this diagnosis it was not clear how any operative procedure could do any good. Another reason for withholding the knife was the fact that pain never was a prominent symptom. It showed itself during the first few hours of the acute illness, but was relieved by a few simple remedies, after which it annoyed us no more while under my care. At no time in the history of the case could I detect any evidence of dead bone. Certainly there was no indication for operating up to the time of the acute illness. I looked upon it as nothing more than an obstinate case of chronic otorrhœa, and that the prolongation of the suppurating process was due to the imprudence of the patient and to hidden granulations in the recesses of the tympanum.

After the acute trouble started in (which was clearly due to exposure), the obscurity of the symptoms, the great prostration of the patient, and the fact that "we did not have good reason to believe that there was pus in the middle ear or mastoid, which could not find an exit by the external canal" (Roosa), led us to decide that the opening of the mastoid cavity was not demanded. I refer to these reasons somewhat in detail because the patient was told in New York that the operation should have been performed. The complete history of the case, together with its most happy termination, shows conclusively that the conservative treatment which he received both here and in New York, and that which was strongly advised by Dr. Jones, of Chichago, was the proper and correct treatment of his case.

Also worthy of note is the favorable influence of the climate of Aiken, S. C. The discharge *never ceased completely* until he went to this place. It stopped a few days after he arrived there and never returned. I doubt if it would have been possible to have completely cured the case in this climate. He went to several other places, such as Washington and New Orleans, but they did not agree with him nearly so well as Aiken. The subject of change of climate as a remedial agent in the treatment of aural troubles is one which I often think is too much neglected. I have frequently noticed that cases of chronic suppuration are very obstinate in our climate, while the chronic non-suppurative cases are often much improved by it.

ROUND-CELLED SARCOMA OF THE EAR.

By J. ORNE GREEN, M.D., of Boston.

(With a wood-cut.)

F. P., aged twenty-three, male, entered the Boston City Hospital Nov. 29, 1882. For the earlier history of the case I am indebted to Dr. F. H. Hooper, who saw him at the dispensary one month before he entered the hospital. There had been an otorrhœa on the left side ever since scarlet-fever at six years of age, continuous and without acute exacerbations. When first seen there was muco-purulent discharge, and a spongy, very vascular, fleshy mass filling the left meatus; this mass seemed to be adherent to the walls of the meatus; there was but little pain. After a time pain came on in the mastoid, followed by redness and swelling of the integument, and he was advised to apply for admission to the hospital or infirmary. Some two weeks afterward he presented himself at the City Hospital.

The left auricle was pushed outward and forward by a diffuse swelling over the mastoid, which had ruptured, and from the opening protruded a mass of fungous granulations two inches in length and one in breadth, dotted with spots of sloughing-tissue, and bleeding freely on touching. The meatus was filled with the above-described fleshy mass, resembling a polypus attached to the posterior wall of the meatus. The general condition was very bad, the appearance cachectic, the patient anæmic and very weak. The pulse and temperature were but little above the normal. He was ordered iron, quinine, and stimulants, and a charcoal poultice.

During the next two days the temperature rose rapidly, and on Dec. 2d there was a severe chill, with great prostration. He was then etherized, the fungous granulations over the mastoid removed, and the swelling incised down to the bone, evacuating

a large amount of fluid and caseous pus. The bone was extensively softened, and with the gouge a large opening was made into the antrum mastoideum. The meatus was cleared from granulations and carious communications were found to exist between the meatus and mastoid. All parts of the petrous bone which could be examined, either from the mastoid or the meatus, were found carious. The bleeding, which was considerable, was readily controlled by pressure. Drainage-tubes were inserted, one into the tympanum through the meatus, and one into the antrum from the mastoid. Douching with carbolic solution, 1 to 60, was used daily.

In the course of forty-eight hours the temperature fell nearly to the normal, there were no further chills, and the pain was less. From this time there was no marked change till Dec. 11th, when the temperature rose from 99.4° F. in the evening of the 10th to 104.8° F. in the evening of the 11th, with severe frontal headache, dimness of sight, and marked chilly feeling, although no rigor. Calomel, gr. j. every two hours through the day, was followed by a free dejection and rapid improvement the next morning, but the same symptoms returned on the 15th, accompanied by lachrymation, profuse perspiration, great somnolence, pain in the eyes, and photophobia, with œdema of the left eyelids and left side of the

face. Three fourths of a grain of morphia were required at night. All of these symptoms passed away in a few days.

Dec. 21st, fluctuation appeared in front of the tragus, was incised, and sero-pus evacuated. Indurated glands were found in the cheek and neck. On the 22d, 24th, and 26th, there were chills, without distinct cause for them being discovered. On the 30th the skin all about the ear was breaking down, the mass over the mastoid was increasing rapidly in size, showed distinct nodular outgrowths, and exhibited no tendency to repair in any part. Dec. 31st and Jany. 1st, there were again chills, with a temperature of 106.7° F., and active delirium. At the same time there was a return of the appearances of the 15th, in the face, probably referable to further disease of the brain sinuses. All soon disappeared, but returned again on the 17th, when dysphagia was complained of. Feby. 26th, paralysis of the left facial was noticed, and continued through life.

The tumor had been increasing steadily in size, and was then estimated to be eight inches in length, six in breadth, and four in thickness over the mastoid ; in addition, it extended below and in front of the auricle. After this report it continued to increase, and large masses sloughed away at different times, pieces as large as a hen's egg being cast off several times. Two or three times small arteries were opened, but the hemorrhage was readily controlled by pressure and iron. The treatment consisted in draining the deeper parts, antiseptic dressings, nourishment and stimulants, and morphine for the pain.

During April and May emaciation became extreme, and for the last few weeks he lay in a semi-comatose state, and finally died from exhaustion on May 21st.

No autopsy could be obtained, but a portion of the tumor was submitted to Dr. W. W. Gannett, Pathologist of the Hospital, for examination, and he reported as follows: "A section showed a smooth, homogeneous, flesh-like, slightly moist surface of a pale grayish color. Microscopically certain portions were made up of connective-tissue fibres, with here and there small collections of round cells. Other portions were much more cellular, being made up of round cells about twice the size of leucocytes, between which a small amount of connective tissue could be seen The tumor is evidently a sarcoma of the round-celled variety."

Unfortunately, the primary origin of the malignant growth could not be determined, as when the patient was first seen the meatus, tympanum, and mastoid were all involved.

The case is of interest from the rarity of such growths in this situation.

A CASE OF FRACTURE OF THE EXTERNAL AUDITORY CANAL BY CONTRECOUP, WITH RUPTURE OF THE DRUMHEAD.

By Dr. CORNELIUS WILLIAMS, of St Paul, Minn.

FORMERLY ASSISTANT SURGEON TO THE OPHTHALMIC AND AURAL INSTITUTE OF NEW YORK.

On the 7th of Dec., 1883, I was called by Dr. Gottfried Stamm, of this city, to see F. K., æt. thirty-seven, who gave the following history, which was, however, only obtained after the lapse of several days, and partly from others.

On the night of the 5th of Dec., while walking on a slippery sidewalk, patient lost his footing and fell backward, striking the back of the head against the ice which covered the walk, with such force as to stun him. He lay for a time, it is not known how long, unconscious, and was carried home in a buggy by friends.

He doesn't recollect any thing of the fall except that his feet slipped from under him, and for several days did not so much as that. He remembers having vomited, and declared that some of the matter vomited, together with blood, came from the ear. It is stated by his landlady that when he was brought home his overcoat and the cushions of the buggy were covered with large quantities of blood. When I saw him, the bedding and especially the pillow presented the appearance as if a woman had just been confined there.

Present Condition.—Rational, complains of great pain in left side of head, pulse slow, temp. normal, the left ext. aud. canal is filled with clotted blood, which I removed by means of the forceps, cotton pellet, etc. While cleansing the canal with the cotton carrier and cotton, the pellet, as I withdrew it, was caught by what proved to be a splinter of bone which was not wholly detached, and protruded through the skin at an angle with the plane of the canal of about 45°. An examination revealed a stellate laceration

of the *Mt*, the handle of the malleus hung seemingly free, attached by its upper portion to the upper fragment of the membrane, and a ragged furrow in the skin extending outward along the junction of the anterior and inferior walls of the canal to the protruding splinter, which corresponded to the beginning of the bony canal. The hearing was now tested on that side, and it was found that the patient heard the tuning-fork in the air and when applied to the mastoid; with the heel of the fork applied to vertex, he heard it more distinctly on left side; watch not heard on contact. After demonstrating the fractured bone to Dr. Stamm I removed it in his presence by seizing and detaching it with a pair of forceps. It measured 4 *mm.* by 3 *mm.* at its broader end, tapering to a point, and was irregular in shape, had a smooth periosteal surface on one side, and the other rough. Dec. 8th, headache continuous, some sanguinolent discharge from ear, ordered ice-bag to side of head. Dec. 15th, Occlusion of canal by the consequent dermatitis and swelling. Dec. 18th, the swelling is subsiding, complained of occasional dizziness. Jan. 10, 1884, *Mt* still red and thickened, some slight discharge, skin where bone was removed and over the furrow described is raised, Hd., 2″ for watch, some headache with dizziness whenever he looks up or stoops. Jan. 12th *Mt* entire, whiter, no discharge, Hd. 4″, watch ($\frac{1}{36}$); complained of headache, dizziness, pains in occipital region. I delivered the patient into the hands of my friend Dr. Stamm, who ordered leeches to the mastoid and rest in bed.

It should have been noted that all along there was pain in the articulation of the left lower jaw, which gradually disappeared. The patient recovered and has only occasional attacks of dizziness.

That the patient in this case fell on the back of his head was indicated by his position when found, lying upon his back and by the fact that the back part of the brim of his stiff felt hat was broken off and lay under his head. The fracture probably extended into the Glaserian fissure, to the tympanum and farther, terminating only when it reached the foramen lacerum medium. It is not probable that any considerable injury was done to or within the labyrinth, but it is probable that there was concussion of the entire labyrinthian contents. There was localized pachymeningitis as indicated by the headache and pain in

temporal region. The impulse of a blow received upon the occiput will be transmitted to, and chiefly expended in, the region where we find the fracture in this case. This fracture may have occurred as the direct result of contrecoup in part or in whole, or it may, perhaps, have been produced by the recoil of the condyle of the jaw which had been driven forward and then forcibly drawn back by active muscular contraction. In this case the wound of the soft parts was not at right angles to the axis of the canal, but otherwise the case may be placed in the first category of Baudrimont's classification.[1]

[1] These ARCHIVES, vol. xii., p. 348.

A CASE OF CARIES OF THE PETROUS PORTION OF THE TEMPORAL BONE, WITH FACIAL PARALYSIS AND FATAL HEMORRHAGE FROM THE CAROTID.

By S. MOOS and H. STEINBRÜGGE, of Heidelberg.

Translated by Dr. Cornelius Williams, of St. Paul, Minn.

With notes of an analogous case, not accompanied by hemorrhage.

Clinical History.—A merchant, twenty-nine years of age, entered the service of Prof. Weil, Oct., '82. A year before he had typhoid fever, and he suffers since then with tinnitus on both sides. For some days, has had pain in the left ear, and, since Oct. 8th, the ear has run.

Present Condition.—There is so much swelling of the left external auditory canal, that only the upper half of the *Mt* is visible, which appears red and thickened. The perforation cannot be seen, but is manifested during Valsalva's experiment by an issue of air and secretion. Boracic-acid treatment.

During the course of the next month, a large perforation made its appearance in the posterior half of the membrane, together with great pain and profuse secretion. Boracic-acid having had no influence over the discharge, it was changed for a ten-per-cent. solution of acetate of lead, which was, however, not borne.

In the third week of December, the hearing on this side was entirely gone. Acoumeter, on the left side, o ; tuning-fork heard only on the right. The patient heard the voice, if spoken directly in the left ear, but probably heard with his right ear. Constant roaring on left. Patient sometimes complains of a "rumbling" as of a carriage, in the right ear. The *Mt*, on this side, is without light-reflex and somewhat opaque. Acoumeter heard at four

metres ; hearing, for speech near by, is good ; owing to the position of the bed, cannot be tested at a distance. The air-douche cannot be used because of the nose-bleed which is produced with each attempt.

The pain continued, and, in the next month, paralysis of the facial appeared, without implication, however, of the branches to the soft palate. The muscles remained responsive to the faradic current.

Membrana tympani is now entirely destroyed. Fluids injected into the ear pass through the Eustachian tube into the throat at once, and produce violent coughing and symptoms of strangulation. The opacity of the mucous membrane of the right *Mt* has much increased, and the patient complains a great deal of a sensation of stuffiness in that ear ; otherwise no change. General condition very bad.[1]

Jan. 31, 1883.—Died from arterial hemorrhage from the right ear.

Autopsy, by Prof. J. ARNOLD.[2] *Extract from the autopsy-notes.* —*Left lung* closely adherent to the costal wall and to the diaphragm. Usual appearances of chronic pleuritis ; small cavities at the apex of the lung ; small nodules in the lung-tissue. *Right lung* same appearance, and, in addition, fresh infiltrations. Everywhere in the tissue of the serous membrane covering the small intestines, the cœcum, bladder, and rectum, tubercular nodules are found. The spleen is adherent to the diaphragm. Extensive loss of tissue of the mucous membrane in the lower part of the descending colon, as well as over the valve of Bauhin (ileo-cœcal).

The mucous membrane of the larynx pale everywhere, and ulcerated in some places ; both vocal cords reddened and swollen.

Macroscopical Examination of the Left Temporal Bone.

Mt entirely destroyed. Malleus gone ; incus is lying on the floor of the tympanum ; stapes preserved and movable. Mucous membrane of tympanum thickened and sclerosed. *The bony framework of the tympanic mouth of the tube is carious.* Particular attention is drawn to a *loss of substance* in the external *bony wall* of the carotid canal which

[1] With reference to the two cases of Eschle (*Deutsche med. Wochenschrift*, 1883), we wish to say that numerous examinations of the secretion removed from the external canal, for bacilli, gave a negative result.

[2] Whom we have to thank for the temporal bone.

measures 15 *mm.* in breadth and 7 *mm.* in height. The artery is bare to the whole extent of this opening and it is corroded and perforated near the promontory. The latter is bare of mucous membrane and periosteum with roughening of the bone—the same roughening of the bone is felt when the sound is made to touch the inner and lower wall of the canal of the carotid. Above the oval window the canal of the facial is carious and laid open to the extent of 2 *mm.* where the nerve is bare.

The mastoid process as well as the bony portion of the ext. aud. canal were sclerosed. The sclerosis was so complete in the mastoid that the thickness of the bone from without to the antrum measured 27 *mm.*

An examination of the labyrinth on this side was omitted in order to save the preparation, which was added to the collection of the ear-clinic.

Microscopic Examination of Facial and Acoustic Nerves.

In a piece of the facial nerve which had lain for seventy-two hours in a one-per-cent solution of osmic acid, and which had been chiselled out of the Fallopian canal just in front of its entrance into the stylo-mastoid foramen, we found the medulla to be remarkably granular. Broad fibrils alternated with smaller ones dark colored, tinged with gray. In the neurilemma a great many fat-granules—otherwise nothing abnormal.

The fibres of the acoustic treated in the same way were found to be much altered. Being teased or even pressed upon through the cover they separated into round or egg-shaped fragments. Where disintegration had not taken place these small bits could be seen ranged in beaded rows and held together by means of the axis-cylinder. The latter was very small but generally well preserved and even in the fragments still recognizable, often projecting for some distance beyond the margin of the fragment. The principal changes seemed to have taken place in the medulla which had everywhere suffered extensive shrinkage, extending even to the axis-cylinder, giving rise to the beaded appearance of the fibres and accounting for the disintegration

of the preparation. The fibres themselves were embedded in a thick matrix consisting of a number of fine grayish-yellow fibres with here and there small hyaline nodules, very similar to those we once observed in a case of acute degeneration of the acoustic nerve following hemorrhagic pachymeningitis.

We content ourselves with having demonstrated this condition without venturing upon an explanation of its significance, since no examination of the labyrinth was undertaken, as above mentioned.

REMARKS.

Aside from the intrinsic interest which this case possesses on account of the hemorrhage from the carotid, it is remarkable because of its rapidity of development—the entire process, caries and all, only occupied four months.

It is to the caries that must be attributed the continuous and severe pain which is quite wanting in many cases of purulent inflammation of the middle ear due to tuberculosis. We have here also a total destruction of the mastoid cells, but it is doubtful if such a marked sclerosis of the bone could develop in so short a time, as well as the caries; perhaps its origin dates from the typhoid fever from which the patient suffered a year ago.[1]

Whether the question be decided one way or the other is of no practical importance and we may, as in a former case of caries of the temporal in which we made a dissection, again refer to the fact *that in cases in which we meet with unexpected difficulties in opening the cells of the mastoid, even when there is caries, we may, as often or oftener, be confronted with a sclerosis as with disorganization of this bone.*

With reference to this case and the critical remarks made by the distinguished authors, the translator may be permitted to add some details of a very similar case, unaccompanied, however, by hemorrhage, nor as yet followed by death.

On Dec. 6, '83, W. W., æt. sixty-five, baker, born in Germany, was sent to me by Dr. G. Stamm, of St. Paul. Patient has suf-

[1] This hypothesis is supported by the fact that upon the other side, on which there was no purulent process, the mastoid showed the same condition.

fered since childhood with discharge from both ears, but has not experienced particular inconvenience until recently.

Present condition.—Moderately thin, but well nourished ; slight discharge from both ears. For some days has complained of intense pain in right side of head, referred chiefly to right temple and ear. Loud voice heard on both sides ; tuning-fork placed on vertex, heard in both ears, more pronounced in right. Ext. aud. canal on both sides much narrowed, only the posterior and upper part of the tympanic space can be seen. In the right ear there are a number of small polypi, which when removed with the snare reveal total destruction of *Mt* as far as can be seen. The probe, passed into the tympanum, is met by dead or bare bone, over all the post. wall of the middle ear which can be reached ; no force whatever was used nor any pain occasioned. Temp. 102° F., no optic neuritis. Patient states that he has had chills, with subsequent sweating, for two weeks. No tenderness or redness over mastoid. I cleansed the ear and dropped in warm alcohol. Ordered ice-bag to cover the temple.

Dec. 8th.—Advised to enter St. Joseph's Hospital, which he did. There is now facial paralysis ; tongue not deflected ; no paralysis of soft palate ; complains of great pain in right eye ; no objective condition of eye to account for it. I gave kal. iod. and ord. ice to be continued ; instil alcohol.

Dec. 9th.—There being some slight pain over mastoid, with the assistance of Dr. J. H. Murphy I made a free incision down through the periosteum.

Dec. 10th.—Less pain ; temp. 102° F.

Dec. 11th.—Temp. normal ; more discharge from ear.

Dec. 12th.—Temp. 101°. Some cough, and deep râles over posterior part of chest ; friction-sound over posterior sup. part of left lung.

Dec. 13th. to *16th.*—Feels much better. Some discharge from incision.

Dec. 17th.—Pain in side of head same as before ; throbbing constant pain in right eye. The temp. again went down on the the 19th, and for several days patient considered himself well enough to leave the hospital. Ice has been continued almost uninterruptedly since entering hospital. An attempt to do without it was immediately followed by pain, which was lessend by its re-application.

Jan. 9, '84.—The pain over the right eye and in the eye is

intolerable; severe pain in region of the ear; facial paralysis unchanged; drooping of upper lid; very great dryness of the right nostril has existed for a week; he complains of disagreeable taste in mouth; has had for some days sensation of fluttering and snapping on right side of forehead. The outline of the right optic disc is not entirely clear, but there are extensive corneal nebeculæ; neuritis cannot be made out; patient sees as well as ever. There being some pain over mastoid, I proposed an operation, as I had several times before, but it was declined. On the 13th the patient left the hospital. His general condition was much better than when he entered. No fever, chills, or sweating. He afterward entered a hospital in a neighboring city and remained for six weeks. His condition is said to be about the same as when he left St. Joseph's.

The condition which I diagnosticated was caries of the post. wall of the tympanum involving the canal of the facial, the caries probably not very extensive, localized pachymeningitis, a low form of sinus-phlebitis, with perhaps the formation of an incomplete thrombus of one or both of the petrosal sinuses. The labyrinth does not seem to be involved as yet. There are all the evidences of extensive sclerosis of the mastoid.

The good result which often comes from incisions through the periosteum of an inflamed bone, or better yet when a portion of an inflamed or sclerosed bone is removed by means of the chisel or drill, is so marked, so unmistakable, that I consider it the duty of the surgeon to operate in this and all similar cases where an opportunity is offered. There is always the possibility that, in opening the mastoid antrum in such cases as this, cholesteatomatous masses or necrosed bone may be revealed and removed; that even if nothing else might come from such a proceeding, it would be quite justifiable. A carious process of a portion of the temporal bone, which, if it go on, will result in fatal intracranial complication, or, as in the most instructive case here given, fatal hemorrhage from the carotid, may, by a timely removal of a piece of the mastoid, opening the antrum or not, in some cases be arrested and life saved. If this much be admitted, then the operation should be done in all

cases where an osteitis, or caries of any portion of the temporal is known to exist.

In this climate where mastoid and other complications of acute otitis media are especially prone to occur, we have frequent opportunities of verifying what I have just said, and my experience in several recent cases has confirmed me in the belief as to the great utility of operation upon the bone even though the antrum be not opened.

The following case will serve as a sample:

Nellie McG., twenty years old, had suffered since Jan. 20, '84, from acute otit. med. pur. Marked periostitis of mastoid.

Feb. 2d.—Wilde's incision made.

Feb. 29th.—Has had a number of chills and rigors; tenderness and pain over mastoid have been renewed and are severe. The probe, passed into the incision, comes into what seems to be a sinus leading into the antrum.

March 1st.—Assisted by Dr. C. A. Wheaton I enlarged the old incision with the intention of enlarging also the fistula in the bone. It was found, however, that the swelling of the soft parts had led to a mistake as to the direction which the probe had taken, and that it had passed under the tip of a rather short mastoid process, and the roughness of the jagged bone had given a sensation as if the probe had entered a fissure in the bone. I then, with Buck's drill, trephined (at the suggestion of Dr. Wheaton, I myself being convinced that it should be done), just below the level of the superior wall of the ext. aud. canal, and $\frac{1}{3}$ of an inch behind it. Illuminating, with a laryngoscope mirror, the hole made by the drill, and clearaway the *débris* by means of a cotton carrier and absorbent cotton, I slowly and carefully penetrated to the depth of $\frac{3}{8}$ of an inch without coming upon either the mastoid cells, antrum, or the venous sinus. It was then thought best by both of us to stop. The bone at the bottom of the opening made by the drill was dense and bled but little (operating in this way I think there is less danger of opening the walls of the sinus than with the chisel).

Mar. 4th.—Doing well. No discharge from ear.

Mar. 7th.—Perforation closed; can hear the watch. A silver drain-tube fixed in the opening into the bone.

Mar. 20th.—Hears watch at $6''$; removed tube; has had no pain or chills since the day after operation.

April 10th.—Wound closed; hears watch at $4'$.

April 22d.—Hears watch at 5′ ($\frac{5}{18}$).

Here the canal of the wound in the bone did not at any time communicate with the antrum or any cells which were not entirely obliterated. It is probable also that there was considerable sclerosis which had come about in less than two months. Immediate and permanent relief was given, which occurred only after the bone was perforated, and was not afforded by the Wilde's incision.

BOUGIEING THE EUSTACHIAN TUBES.

By Von A. EITELBERG,

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DIMINUTION of the calibre of the Eustachian tubes can only be diagnosticated by means of very careful bougieing. It is true there is another method by which we may obtain important information as to the lumen of the tubes,—I mean the plan of A. Hartmann.[1] He measured manometrically the pressure force required to drive air through the Eustachian tubes into the middle ear. It is sometimes possible by this method to ascertain the situation of the obstruction.

In a given case if we thus employ, first, the method of Politzer, and then the catheter, and find less resistance to the entrance of air with the latter, we may conclude that the obstruction is in the pharyngeal part of the tube. The point of the catheter is presumed to have passed the place of constriction in the tube. Constrictions in the cartilaginous portion of the tube, however, particularly at the isthmus, are only to be appreciated by the introduction of bougies of varying calibre. In such cases the auscultation sounds are unreliable, for, according to the experience of Urbantschitsch,[2] a stricture of the tube is frequently de-

[1] "On the Functional Importance of the Eustachian Tubes." Leipzig, 1879.

[2] Bougieing the Eustachian tubes in chronic disease of the middle ear, especially in chronic middle ear catarrh. *Wiener med. Presse*, 1883, Nos. 1–3.

tected, especially at the isthmus, when the probe is employed, where, during catheterization, the air passed apparently without obstacle. In the light of these facts the criteria, as arranged by Rau,[1] for the recognition of changes of lumen of the tubes according to the auscultation sounds perceived, must be materially modified.

Urbantschitsch always advises, therefore, in diseases of the middle ear, and especially in chronic middle-ear catarrh, to bougie the Eustachian tubes, as symptoms may be thus accounted for that are not explained by an inspection of the membrane.

In a medico-legal sense the importance of examinations of the Eustachian tubes by means of the probe is well illustrated by a very recent case published by Bezold,[2] which concerned an individual who had received a stab-wound in the left ear, wounding the Eustachian tube of that side, and who testified in court to having acquired a marked degree of deafness as a consequence thereof, and upon which testimony the charge of supposed simulation and perjury was based, because the medical testimony for the State opposed the claim of the accused that the deafness claimed was due to the wound. Bezold, to whom the patient was referred for an expert examination of the ear, reported, sustaining the claim of the accused, with especial reference to the fact that "absolute impermeability of the tube existed for a powerful stream of compressed air, and that *a thin whalebone probe could be passed for* 14 *mm. beyond the end of the catheter into the tube, but there met an impassable obstruction.*"

According to Lincke,[3] some forms of disease of the mucous membrane produce circular or unilateral narrowing, the existence of which may be recognized by the fact that a fine sound or a small catgut may be introduced as far as the obstruction and no farther, and when withdrawn from the tube will sometimes be found with the tip colored with blood.

[1] "Lehrbuch der Ohrenheilkunde." Berlin, 1856, pages 40, 41.

[2] A case of perforating wound of the organs of hearing in court, and subsequent indictment of the plaintiff for supposed simulation and perjury, *Berliner klin. Wochenschrift*, 1883, No. 40.

[3] "Handbuch der theoretischen und practischen Ohrenheilkunde," Bd. ii., p. 463.

Among those who most zealously cultivated the employment of bougies for the Eustachian tubes in Germany was Kramer. He made use of bougies as a therapeutic agent in stricture of the tube, and also as a vehicle for the application of medicaments. He therefore recommended, in catarrhal inflammation of the tubes, with an exclusively submucous infiltration, the introduction of thin bougies ($\frac{1}{6}-\frac{1}{4}$ *mm.*) which had been soaked in a solution of atropine or of nitrate of silver.[1]

The bougieing of 163 Eustachian tubes in 100 individuals, the results of which forming as they do the subject of this paper, was not undertaken for the purpose of an examination as to the therapeutical value of that procedure, but to establish the frequency with which diminution, especially at the isthmus, of the calibre of the tubes occurs in the several diseases of the organ of hearing. The proposition to establish in the living the distance from the pharyngeal orifice of the tube to the isthmus by accurate measurement had to be given up for the following reasons. It is true that in very many cases one may be enabled to conclude, from the feeling of resistance encountered, that the tip of the bougie has entered the isthmus, and from the fact that by an increase of force the resistance is overcome, that the isthmus has been passed. Aside from the fact, however, that annular or even one-sided swelling in the cartilaginous portion of the tube may give rise to similar sensations, there occur at the isthmus depressions which may present a resistance to the passage of the probe identical with that offered by a stricture. On the other side cases are not so rare in which the largest bougie in use, $1\frac{1}{2}$ *mm.* in thickness, may be passed through the isthmus without the employment of unusual force. There is another condition which must also be considered here, as pointed out by Urbantschitsch (*l. c.*), to wit, we are not always able to control the extent to which the catheter enters the tube.

In order to obtain a little more light on this subject I instituted the series of experiments, as hereafter detailed, upon the cadaver, and ascertained that the penetration of

[1] "Handbuch der Ohrenheilkunde," Berlin, 1867, pp. 286 and 287.

the catheter amounted to from 6 to 11 *mm.* According to Kramer[1] the point of the catheter must lie about one line within the superior angle of the tube in order that a bougie may be introduced. Hyrtl[2] declares that the catheter cannot be introduced farther than three to four lines, *i. e.* 6 to 8 *mm.* in the Eustachian tube, because of its rapid diminution of calibre.

Tröltsch[3] maintains that the tip of the catheter may be thrust for 10 *mm.* and even farther through the ostium pharyngeum. All this will vary however with the size, length, and curvature of the catheter used, as well as with the peculiarity of the tube operated upon.

The length of that section of the tube from the ostium pharyngeum to the isthmus is generally estimated at about 24 *mm.*, which nearly coincides with the fact.

The longest tube among fifteen *fresh* preparations which were measured by me, was 48 *mm.*, in which case the isthmus was 28 *mm.* from the pharyngeal orifice. In the following deductions I will assume it as established by the evidence adduced, that when the bougie has penetrated beyond the end of the catheter in the Eustachian tube to the extent of 24 *mm.*, that it has passed this isthmus.

The normal width of the isthmus is $1\frac{1}{2}$ to 2 *mm*, though in individual cases it may exceed this. Kramer, *l. c.*, Tröltsch, *l. c.*, and others. Thus Huschke[4] gave the height of the isthmus as $1\frac{1}{2}$ lines, and its breadth at $\frac{1}{4}$ to $\frac{1}{3}$ of a line. C. Lange[5] says that the narrowest part of the tube, ad maximo distended, represents a double funnel and is passable for a sound of 2 to 3 *mm.* in diameter. In the living we may also conclude, from the ease with which a probe having a diameter of $1\frac{1}{3}$ *mm.* can be passed beyond the isthmus, that it has a very appreciable width. It should be mentioned here that, according to Schwartze,[6] in sclerosis of

[1] *Loc. cit.*, page 5.

[2] "Handbuch der topographischen Anatomie," etc., 4 Auflage, Wien, 1860, I. Bd., pag. 254.

[3] "Lehrbuch der Ohrenheilkunde," 7 Auflage, Leipzig, 1881, p. 380.

[4] Th. v. Sömmering's "Lehre von den Eingeweiden und Sinnesorganen des menschlichen Körpers," Umgearbeitet und Vollendet von E. Huschke, Leipzig, 1844, p. 835.

[5] "Lehrbuch der Anatomie des Menschen," Wien, 1865, p. 731.

[6] Gehör-Organ im "Handbuch der pathologischen Anatomie," von Klebs, Berlin, 1878, 6. Lieferung, p. 106.

the mucous membrane of the tympanum an *acquired dilatation* of the whole length of the Eustachian tubes often occurs, so that the lumen of the canal may be increased to three or four times the normal. According to the same author, as a result of chronic purulent tympanitis, atrophy of the bony walls of the canal may ensue with resultant partial dilatation of that section.

According to Urbantschitsch, *l. c.*, where the isthmus still permits the passage of a sound having a diameter of $1\frac{1}{3}$ *mm.* without especial difficulty, there is no indication for treatment by means of bougies; for there is here no condition of the mucous membrane which would be favorably influenced by bougieing.

In my examinations I used the French filiform bougies à boule, of the diameter of $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, and $\frac{4}{3}$ *mm.* (Nos. 1, 2, 3, and 4 Charrière's standard). For my purposes these sufficed; in practice, however, the intermediate Nos., $1\frac{1}{3}$, $2\frac{1}{3}$ and $3\frac{1}{3}$, will be needed. Neither did I observe the same order of succession which must be followed in treatment, but began at once with the largest size, passing to the next lower number if not successful in passing the isthmus with the first. In this manner much time was saved without in the least lessening the exactness of the result.

Before each introduction of the bougie assurance was obtained that the catheter was in proper position by forcing air through the catheter, and the act of bougieing was considered as successful if the catheter remained immovable while the patient coughed or spoke.

There are, of course, some cases where the tip of the catheter remains fixed in the mouth of the tube, or even in Rosenmüller's fossa without extraneous aid. These cases are, however, upon the whole, rare. Another confirmatory proof for me was, that the patient experienced a stitch in the direction of, or in the ear itself. It is hardly necessary to add that all the precautionary rules of procedure were the more carefully observed, since in a large majority of the cases I was obliged repeatedly to introduce the bougie at *the same sitting.*

In the greater number of the following cases the bougie

was used on both sides. The diseases as enumerated were :

1.	Bilateral middle-ear catarrh . .	53 times.
2.	Unilateral " " . . .	11 "
3.	Bilateral tympanitis pur. chron. . .	6 "
4.	Unilateral " " " . .	7 "
5.	" " " acute . .	4 "
6.	Bilateral by-gone tymp. pur. chron. .	8 "
7.	Unilateral " " " " .	2 "
8.	Bilateral affectio acustica . . .	6 "
9.	Both sides, various affections . .	3 "
	Total . .	100 cases.

The persons subjected to examination were from fourteen to eighty-five years of age ; the sexes equally divided.

The last three cases in the list require to be spoken of more in detail. In the first there was chronic middle-ear catarrh on the right side ; with affectio acustica, left. In the second, right, a by-gone tympanitis, pur. chron. ; left, chron. middle-ear catarrh. In the third, persistent tympanitis, pur. chron., right ; with same by-gone, in the left.

Narrowing at the isthmus was shown in 1, 35 times ; 2, 3 times ; 3, 3 times ; 4, 6 times ; 5, 3 times ; 6, 6 times ; 7, 1 time ; 8, 4 times ; and 9, 2 times.

The frequency with which narrowing of the tube occurs in chronic middle-ear catarrh emphasizes and confirms the opinion of Urbantschitsch, *loc. cit.*, that, in this form of disease, examination with the sound should never be omitted, as also in the treatment of such cases bougies cannot well be dispensed with. Other forms of disease are here too poorly represented to allow of any conclusions as to the frequency with which diminution of calibre of the Eustachian tubes occurs in them. At any rate, the comparatively frequent occurrence of narrowing of the isthmus of the tube here shown in purulent middle-ear inflammation, as well as in by-gone purulent tympanitis, is remarkable.

That narrowing of the tube at the isthmus should be found only three times in eleven cases of one-sided middle-ear catarrh, is due to the fact that the swelling of the

mucous membrane has usually subsided when the patient consults a specialist because of the other symptoms of the disease.

Cases occur, however, where, in spite of the existence for years of a catarrhal inflammation of the naso-pharyngeal mucous membrane, no diminution of calibre of the tubes is to be found. The isthmus on both sides, in a woman æt. thirty-nine, who had suffered for a long time with a marked pharyngitis, with swelling of the nasal mucous membrane, and who was also scrofulous to a high degree, was found to be passable to a No. 4 Charrière. She had been for twenty years afflicted with caries of the left elbow-joint, and had numerous scars on her neck, the result of suppuration of glands. In addition to this, she had a bilateral purulent tympanitis, which had existed since childhood. I introduced the bougie very soon after the patient came under treatment for her ear and the naso-pharyngeal trouble.

Another patient, a twenty-year-old girl, who had had bilateral purulent tympanitis since childhood, which was quiescent for a short time only at long intervals, had almost abnormally wide Eustachian canals. The bougie could be passed with facility until that portion engaged at the isthmus measured more than 2 *mm.* in diameter. This case is exquisite, in that the bougie emerged through the external auditory canal, which, as is well known, does n't often occur. The length of the tube, in so far as such a measurement on the living may be depended upon, was about 35 *mm.*

Since, in one hundred persons, the bougie was introduced sixty-three times on both sides, it may be worth while to discuss the comparative relative relation of the two tubes. That the examination was confined to one side in the remaining thirty-seven cases, is due in part to the fact, that some of the patients did not permit it; and, in others, one side of the nose was impassable to the catheter which I used. I find in my notes that the right side was generally indicated as the one where the obstacle existed. It must be expressly noted, however, that in *all cases* in which catheterization was repeated, the introduction of another

catheter of a different curvature and size was, without exception, successful, where the obstacle had been impassable to the thicker instrument. I only remember *one case* of the great number treated in this way, in the course of several years, where an obstacle presented which could not be overcome. Even in the apparently most difficult cases, perseverance and patience in the end succeeded.

Among the sixty-three cases which were examined as to both sides, thirty-four had catarrh of the tympanum, and in eleven cases there was a difference of lumen of the two tubes. A difference of *one* number (*Charrière*) eight times, and two numbers three times. The tubes on both sides were normal fifteen times. Among these last, one deserves particular mention on account of the nasal polypi which were repeatedly removed by means of the galvano-caustic apparatus.

In unilateral catarrh of the tympanum, to preserve the sequence as above, in two cases there was a difference of one number, and in two cases the tubes were normal.

Five cases of bilateral tymp. pur. chron. showed no difference of lumen in the two tubes. In three cases of this group, in which the two before named are included, the tubes were of normal calibre.

In unilateral tymp. pur. chron., in four cases there was a difference of one number in one case, and in one case both sides were of normal size.

In the single case of tympanitis pur. acuta no narrowing of the tube existed.

In six cases of bilateral by-gone purulent tympanitis a difference of one number existed in one case only; likewise, in one case the isthmus on both sides easily admitted a bougie of $1\frac{1}{3}$ *mm.*

In one case of unilateral by-gone tympanitis pur. there was a difference of one number.

Five cases of affectio acustica showed in one case a difference of one number, and twice tubes of normal calibre.

In three cases variously affected on both sides, the tubes were of different size in the same individual, at different times; in one case they varied by one number, and in

another the isthmus on both sides remained passable for a bougie of 1⅓ *mm.* in diameter.

If we consider the 163 cases together, in all of which the bougie had been introduced, we find that seventy-nine admitted No. 4, sixty-one No. 3, and fourteen No. 1. No mention is made of No. 2, because I find no note in any case that I was able to introduce it to any considerable extent farther than No. 3. In nine cases No. 1 could not be made to pass the isthmus. That this did not indicate closure of the tube was proven by the fact that air could be made to pass into the tympanum through the tube. Permanent closure of the tube is rare to that degree that Kramer,[1] to prove the "inutility of rhinoscopy," declares that in a practice of thirty-six years he did not meet a single case with insurmountable obstacle to catheterization and other forms of examination of the tubes, and hence he "never had occasion, save in *one* case, to plague his ear-patients with rhinoscopy."

Permanent obliteration of the pharyngeal opening of the tube, particularly as the result of syphilitic and diphtheritic ulceration, though rare, has been repeatedly observed, and confirmed by post-mortem examination, as well as closure of the ostium tympanicum as the result of purulent tympanitis. Permanent obliteration, however, in the continuity of the tube, except from a wound of the cartilaginous tube, as in the case of Bezold, *l. c.*, has hardly ever been observed. Only Wever[2] reports a case of total closure of the entire tube "by a fibrous substance which was closely connected with the mucous membrane."

The occurrence of stricture in the middle part of the canal is exceedingly rare, according to post-mortem records of experienced authors, and Schwartze[3] says: "Real strictures, such as occur in the urethra (through thickening and atrophic shortening of the tissue), would seem not to take place in the Eustachian tubes at all."

I must mention the fact, not to leave my report uncompleted, that in three cases I succeeded in passing a larger

[1] *Loc. cit.*, p. 254.

[2] Quoted in Schwartze's "Gehör-Organ," page 107.

[3] *Loc. cit.*, page 105.

bougie relatively farther in the canal than one of smaller size. This may be due to the fact that a larger bougie is less apt to become engaged by folds of mucous membrane, and also that when a bougie of larger size does become so engaged rotation on its long axis more readily releases it. Whether this fact may be so interpreted, that by greater stretching of the swollen mucous membrane, and by closer application of it to the walls of the tube, the larger bougie is enabled to penetrate farther than a smaller one, must remain undecided, for I do not remember to have ever seen any such projection of folds of the mucous membrane in the cadaver; still, according to Schwartze,[1] in chronic cases numerous folds and projections of the membrane at right angles to the axis of the tube do occur. They are generally situated at the pharyngeal orifice; higher up they are much less frequent, and most rarely in the bony portion of the canal.

I have not experienced any unpleasant accidents as the result of bougieing the tube, if I except emphysema three times, which was very slight and soon disappeared. If it be considered that I was obliged to bougie two or three times in each case in order to be sure of the amount of narrowing, and that with every change of the bougie I forced air through the tubes into the tympanum in order to be sure of the position of the catheter, and that in many cases a marked flaccidity of the mucous membrane of the naso-pharyngeal cavity and of the ostium pharyngeum tubæ existed, the accident certainly did not occur often. It is, however, demonstrated that with practice and careful manipulation the probability of such an unpleasant complication as a considerable emphysema will be reduced to the minimum. I must also emphasize the fact that one of the cases of emphysema did not occur as the result of the introduction of the bougie, but from catheterization, which I had done at a preceding sitting to prepare the way for the introduction of the bougie. That I may not have wounded the naso-pharyngeal mucous membrane, though it was much swollen, is quite probable, for there may have been a pre-existing tear which occasioned the emphysema.

[1] *L. c.*, page 102.

For the purpose of comparing the results of the experimentation upon the living with the same procedure upon the dead, but still more to inform myself as to certain things pertaining closely or remotely to the introduction of the bougie, I instituted a series of twenty-five post-mortem examinations of the organs of hearing, fifteen of which were upon adults and ten upon children of three years and under, in the following manner: The crania were sawn in two through the sagittal diameter, and after the roof of the tympanum had been removed, the height, and when the ostium pharyngeum gaped, also the breadth, of the Eustachian tube were measured, and finally the width, breadth, and depth of the fossa of Rosenmüller. Then I introduced, on the side of the head to which was attached the septum narium, a catheter of the same curvature but a little smaller (about $\frac{1}{3}$ *mm.*) than the one which I had used upon the living. It was made to penetrate as far as possible into the mouth of the tube, using the same manipulation as employed in the other series of experiments. The depth to which the catheter penetrated was carefully marked; then the catheter withdrawn and the extent of its penetration measured. I next introduced a bougie as large as would pass the isthmus, and when it appeared at the tympanic orifice of the tube I determined the length of the entire tube as well as its size at the isthmus. Now the bougie was pushed farther into the tympanum in order to see what direction it took, and in case it impinged upon the malleus to ascertain the distance of the latter from the tympanic mouth of the tube. After laying open the tube as far as the isthmus the cartilaginous portion was measured and the mucous membrane of the tube inspected. The bony portion of the canal was then laid open, through the centre of its long axis, with the saw. In the first case, after the ostium tympanicum had been exposed and measured in its two principal diameters, the bony canal was opened and its length determined. The measurement of the cartilaginous and bony canal together served as a check upon the measurement which had before been taken of the tube as a whole. According to Hyrtl, *l. c.*, the length of the tube is about one and a half inches, or

about 36 *mm.* I found the length of the Eustachian tube in adults to be between 36 and 44 *mm.*, and the isthmus to be from 24 to 28 *mm.* from the pharyngeal mouth. In the newly-born the tube is on the average 19 *mm.* long, eleven of which are in the cartillaginous and eight in the bony portion. In a child two and a half years old the Eustachian tubes were 23 *mm.* long, the cartilaginous 13, and the bony portion 10 *mm.* According to Huschke, *l. c.*, the length of the tube is fourteen to seventeen or eighteen lines in length, five to seven of which belong to the bony portion and ten to twelve to the cartilaginous. In the preparations from adults a sound two *mm.* in diameter could only be forced past the isthmus in two cases, while in the newly-born a sound of that size could always be passed; a condition which von Tröltsch [1] had in a general way remarked. He said: "The infantile tube, which is much shorter than that of adults, is not only relatively but absolutely wider at its narrowest portion."

In one of the adult tubes there was a depression in the bony portion which rendered the passage of the bougie as far as the tympanum impossible; the canal on the other side was normal. Kramer [2] came upon an obstacle on both sides in bougieing the Eustachian tubes in the cadaver. On the right side the obstacle was overcome; on the left, it was not attempted. After the tubes were opened it was learned that there was a depression in the bony canals on both sides. In another cadaver, where there was likewise an obstruction, it was found that the bougie was kept back by a flat bony projection on one side, and on the other by a narrow portion of the cartilaginous tube. Voltolini, in the cadaver of a man fifty years old, dead of morbus Brightii, saw a knee-shaped deviation of the tube, anteriorly, at the junction of the bony with the cartilaginous tube. On pushing a sonde à boule through the tube an obstacle was encountered an inch from the pharyngeal mouth of the tube, which was readily overcome; when being still farther pressed forward in the tympanum, it penetrated the mucous

[1] *Loc. cit.*, page 197.

[2] *Loc. cit.*, p. 4.

[3] See *Monatschrift f. O.*, 1877, No. 3.

membrane over the promontory, and took a direction directly backward. After having been withdrawn and re-introduced and given another direction, it was afterward found that it had now entered the carotid canal.

The height of the pharyngeal mouth of the tube varied from six to nine *mm.* This variation depended, at least in part, upon whether the mouth of the tube was slit-shaped or oval; in the latter case the opening seemed to be widened at the expense of height. When the mouth gaped the height was reduced to three or four *mm.* In the newly-born the pharyngeal mouth of the tube is from three to four *mm.*, and the tympanic mouth three *mm.*, which is increased by barely one *mm.* in adults.

According to Kramer,[1] the distance from the ostium tympanicum to the head of the malleus, or handle, is three lines; according to my measurements the distance is from four to eight *mm.*

From a comparison of the measurements of the various sections of the tube and the proportion of the catheter introduced into the canal, given herewith, it follows, that when the bougie has been introduced about 24 *mm.* beyond the end of the catheter, it is enough, since then the instrument has passed the isthmus. Only in exceptional cases, in which a closure of the tympanic mouth of the tube is suspected, is there an indication, for the purpose of confirming the diagnosis, to push the bougie as far as the supposed occlusion.

Finally, let it be said here, that with the exception of *one* case, that of a two-year-old child who had suffered from bilateral tympanitis pur., and in whom the mucous membrane was moderately swollen, the mucous membrane of the tubes in all other cases appeared to macroscopic examination normal.

As to the direction which an instrument may take when introduced into the tympanum, Voltolini, *l.c.*, expresses himself as follows: "A probe goes for about a line in a direction parallel to the membrana tympani, along the inner wall of the tympanum, over the promontory directly tow-

[1] *Loc. cit.*, p. 5.

ard its posterior wall, and on its way generally strikes the chain of ossicula, particularly the stapes or the long process of the incus. Generally the sound or bougie goes straight through the angle which is formed by the stapes with the long process of the incus." In the majority of the twenty-five cases which I examined with reference to the direction taken by the bougie, it impinged against the head or the manubrium of the malleus. Seven times the bougie passed above the angle formed by the long process of the incus with the stapes toward the mastoid antrum; twice it impinged against the short process of the incus; once the bougie could not be made to enter the tympanum, on account of a fissure in the bony canal of the tube, and once it passed out at the ext. aud. canal. A similar experience in the living subject I have already mentioned. Voltolini, *l. c.*, reports a similar case. The bougie behaved as if it were constantly doubling upon itself at the pharyngeal mouth of the tube until it finally emerged at the ext. aud. canal, having perforated the membrana tympani in front of the handle of the malleus near the short process, following the posterior superior wall of the canal until it appeared externally. In my case there existed, in consequence of a long-continued purulent otit. med., total destruction of the *Mt.* In another case of Voltolini's, *l. c.*, a bony projection extended into the tympanic mouth of the tube, and when the sound passed over this process, it followed the roof of the cavity, and if under it, the floor. In the observations of Kramer, *l. c.*, the bougie, when it entered the tympanum at all always struck either the handle or head of the malleus. Hence it may happen that a bougie pressed with too much energy into the tympanum may cause great and not always reparable damage.

The pharyngeal recess (fossa of Rosenmüller) has a practical interest for the aurist in this far that, according to William Meyer,[1] it presents the place of election for adenoid growths: "Der constant und exquisit, das vorkommen adenoider Substanz darbietet." Meyer quite frequently saw the pharyngeal recess completely filled with a

[1] On adenoid vegetations in the pharyngeal recess. *Arch., f. O.*, new series, Bd. I., pages 253 to 254.

friable mass, the effect of which upon the tube in a case where there might be no other adenoid growth requires no comment.

In some respects a case observed by Schwartze,[1] would seem to oppose this view. Here a luxuriant tuberculous growth surrounded the fossa on one side, the recess itself being converted into a crater-form excavation twice the depth of that of its fellow.

I found the fossa of Rosenmüller in children to be from 5 to 8 *mm.* high; in adults, 14 to 25 *mm.*, and in the latter, 6 to 10 *mm.* deep; it has sometimes three times the elevation of the pharyngeal mouth of the tube on that side.

In regard to the therapeutical value of bougieing the Eustachian tube, I refer among others to the work of Urbantschitsch, and to the observations of the author.[2]

[1] *Loc. cit.*, pages 103, 104.

[2] *Zeitschr. f. Ohrenheilk.* Bd. XII., page 162, ff.

REPORT ON THE TWENTIETH ANNUAL MEETING OF THE AMERICAN OTOLOGICAL SOCIETY.

HELD ON THE 15TH JULY, 1884, AT THE GRAND HOTEL, CATSKILL MOUNTAINS.

By H. KNAPP.

In the absence of the President, Dr. C. H. Burnett, the chair was occupied by Dr. J. S. Prout, Vice-president.

The first paper was on

The Indications for Opening the Mastoid Process, Based on some Recent Observations, by H. KNAPP, of New York. The discussions on opening the mastoid, which were held in this Society last year, showed, the speaker said, greater divergence of opinion than the acquired knowledge of the profession seemed to warrant. He did not purpose to speak on the propriety of opening the mastoid in general, but to limit his remarks to the indication of this operation in three groups of cases, of each of which he would report one case from his recent practice.

1. *In acute purulent ot. med., the mastoid should be opened even if the post-aural region show nothing abnormal, when cerebral symptoms continue unabated in spite of an apparently free discharge after spontaneous or artificial perforation of the Mt.* The case reported, in support of this proposition, refers to a man suffering from acute otit. med.: paracentesis, free discharge, but for two weeks continuance of intense headache, dizziness, and nausea. On chiselling the mastoid open, a considerable quantity of matter escaped. Complete recovery in 7 weeks.

2. *In chronic purulent otitis media the mastoid should be opened when the size of the mastoid or a hard bony prominence of the pos-*

terior osseous wall of the ear-canal indicate sclerosing mastoiditis, and when, in spite of careful treatment of the tympanic cavity, cerebral symptoms, especially headache, are either constant or recur in frequent paroxysms. A case of this kind was reported, which had lasted more than ten years, rendering an otherwise healthy man unfit for work. The operation confirmed the sclerosing process, liberated mucoid secretion, and removed the headache. A perforated silver canula keeps the perforation open until the sclerosing process has exhausted itself.

3. *In subacute or chrnoic sclerosing* (*condensing, Buck*) *non-suppurative mastoiditis interna with an intact Mt, the mastoid may be opened when cerebral symptoms, especially intense and obstinate pain, radiating from the mastoid over the whole side of the head, incapacitate the patient for any work.* Under a wrong diagnosis every aurist of more extended experience has benefited some patients by trephining or chiselling a sclerosed mastoid process. Dr. K. has done the operation intentionally, under a correct diagnosis, in two cases, with perfect success. The first was published three years ago in the ARCHIVES OF OTOLOGY, vol. x, p. 365. The second occurred last winter. The patient—who for two months could not sleep, was constantly groaning for pain in mastoid and head, was confined to his room and bed, the head bundled up in cotton—was completely relieved by the operation, though no secretion was evacuated from the small, exceedingly vascular cells of the sclerosing mastoid. In six weeks he returned to his business, an altered man, and has remained well.

In conclusion Dr. K. described the manner in which he was accustomed to perform the operation : Small chisel, clean sponges for cleansing, perforated silver tubes for drainage, the mildest antiseptics for dressing, wound closed with sutures and compressive bandage in cases of sclerosis to obtain primary union, wound not united but without drainage-tube in acute mastoiditis, many cases of which get well immediately after the evacuation of the retained pus.

The second paper was on the same subject: **A Case of Eburnating Mastoiditis,** by J. A. LIPPINCOTT, of Pittsburgh, Pa. A girl of 17, *Mt* pale, dull ; light-cone absent. Hearing diminished. Inflation easy. Some tenderness upon pressure on mastoid. Constant dull pain in mastoid, great pain in head, anorexia, depression of mind. For about two years topical and general treatment, inparticular KI and Hg, of no benefit. Mas-

toid, which was sclerosed, trephined to the depth of 17 *mm.* The pain disappeared and the hearing increased.

A lengthy discussion followed the reading of these two papers.

A. H. BUCK said that one of the benefits of the operation was to promote a free discharge, which he considered to be a powerful counter-irritation.

C. J. KIPP explores the bone when the peritosteum is detached, in order to find a place more discolored and softer than the others; in this place he makes the opening.

S. THEOBALD thinks that constitutional remedies may do a great deal of good, in particular iodide of potassium and mercury, in periostitic and hyperostotic processes.

S. SEXTON showed a series of photographs of neglected cases of mastoid disease, in which spontaneous perforation had occurred. He remembers but one of these cases—a child—that died. He had derived great benefit from the internal administration of sulphide of calcium. He would prefer to open the posterior osseous wall of the ear-canal in order to get access to the antrum.

W. W. SEELY thinks that the external opening is easily established and in itself of no consequence. He said that *optic neuritis* could not be used as an indication.

C. J. KIPP has seen one-sided optic neuritis. Death mostly occurs without optic neuritis, and optic neuritis from ear disease may get well.

J. A. ANDREWS related a new case of *purulent ostitis* without external abnormity of the mastoid, but with *optic neuritis.* He took the latter symptom as a guide, opened the mastoid, found pus, and later a sequestrum, after the removal of which the patient recovered.

T. R. POOLEY has seen a case of one-sided optic neuritis which set in after the mastoid had been opened. Symptoms of thrombosis of the sinuses were present.

S. J. JONES remarked that the patient to whom Dr. Knapp had alluded as having had pronounced bilateral optic neuritis in the course of tympano-mastoiditis, had had no intra-ocular abnormity when he examined him during the acme of the inflammation.

A. MATHEWSON has not seen such decided benefit from opening the mastoid in cases of sclerosis, as to advise the patient to take the risk of the operation.

A. H. BUCK defines his plan of treatment thus: In *chronic* cases sclerosis is always present. There may be no external abnormity,

no tenderness on pressure, etc. If there is inadequate vent for the discharge, he opens the mastoid. He has tried to establish a channel into the mastoid through the middle ear, but found the procedure too difficult, and the consequence was such a degree of irritation and swelling that the outlet of the discharge was more impeded than before, and the patients suffered considerably. In *acute* cases there may be cause for disputing. He takes his decision by asking himself the question whether there is a sufficient outlet for the discharge. If not, he operates. We do not always find matter, and yet the patients are benefited by the counter-irritation.

A. H. BUCK, of New York, read a paper on the **Use of Large Doses of Iodide of Potassium in Cases of Rapid Loss of Hearing from Syphilitic Disease.** He had found in literature only four cases in which this disease had been benefited by large doses of iodide of potassium—two by Roosa and two by Webster. He reported five cases :

CASE 1. Rapid loss of hearing, from syphilis, with mania. The mania was cured by very large doses of iodide of potassium, the deafness remained.

CASE 2. Used hydrargyrum, later iodide of potassium. No improvement.

CASE 3. Syphilis 25 years previously. Deafness not cured.

CASE 4. Syphilitic deafness in right, sudden in left before. No result from treatment.

CASE 5. Syphilis. Sudden and total loss of hearing in both ears. Only slight benefit from treatment.

T. R. POOLEY has seen such a case in which the hearing improved to understanding ordinary voice at 5′.

H. KNAPP remembers two cases of total binaural deafness from syphilis, hearing lost almost suddenly. He treated them at the hospital for months with mercurials and large doses of iodide of potassium. The deafness was and remained absolute.

S. SEXTON has seen from 15 to 20 cases of more or less marked loss of hearing from syphilis. He thinks that the large doses of KI and Hg are of no benefit in otherwise hopeless cases, and are not needed in cases which by their nature are amenable to treatment.

C. J. KIPP has during the last year repeatedly found that inherited syphilitic ear-disease was of tympanic origin, whereas formerly he believed it to be labyrinthine exclusively.

A. H. BUCK mentioned a case of syphilitic ear-disease complicated with hemiplegia, treated and improved with Hg and KI.

S. J. JONES asked whether KI alone or Hg produced the good result.

H. KNAPP said that he had treated a gentleman for syphilitic middle-ear disease a long time locally in the ordinary way and with small and moderate doses of KI. Hemiplegia occurring, he sent the patient to Dr. Loomis, who ordered very large doses, from 15 to 30 grams a day; the patient very soon improved, his hemiplegia disappeared, and the hearing was somewhat improved. This was about ten years ago, and the patient has had no relapse nor any other syphilitic manifestation.

A. MATHEWSON also mentioned two cases.

W. W. SEELY, of Cincinnati, read a paper on the **Treatment of Suppurative Otitis Media,** in which he laid great stress on cleanliness and keeping the E. tube patulous. In some cases he instilled an infusion of **jequirity** into the ear. It was followed by discharge and pains, in one case by excessive pain for two nights. Results good.

J. J. B. VERMYNE, of New Bedford, Mass., read two papers. The first on a **Tumor Springing from the Ethmoid,** in consequence of chronic catarrh of the naso-pharynx, and causing exophthalmus; the *second* on a case of **Myxofibroma from the Basis Cranii,** causing blindness, and seven years later complete deafness by destruction of the labyrinth. The autopsy showed that the tumor had extended considerably into the middle cranial fossa.

C. J. KIPP, of Newark, N. J., read a paper on **Tumors of the Auricle.** Report of three cases of an epithelioma situated in the concha, measuring *12 mm.* by *7 mm.* Its clinical aspect was that of a granuloma, but its structure that of an epithelioma.

L. HOWE, of Buffalo, N. Y., read a paper on a case of **Othæmatoma of both Ears.** He injected ergot, 3–5 drops, which improved the disease.

S. SEXTON believes that othæmatoma auris is almost always of traumatic origin.

H. SEXTON showed a photograph of a case of sarcoma in the concha, and of a number of other cases; he exhibited, further, **several plaster casts of diseased sets of teeth taken from persons suffering from ear disease.**

Prof. CLARKE, delegate from the Society of Deaf-Mute Teachers,

made interesting remarks about a new acoumeter, devised by Prof. Graham Bell; further, on the keen perception of vibrations by deaf-mutes, and asked whether or not it was possible to increase the acuteness of hearing by education. It seemed to be the sense of the Society that education, much as it could do to raise the usefulness of the auditory organ, could scarcely be supposed to be capable of increasing the acuteness of hearing, which, like the acuteness of sight, depended on the physical conditions of the auditory organ, not on practice. Referred to a committee.

Before adjourning, the Society elected as officers for the next year, C. H. BURNETT, President; and J. J. B. VERMYNE, Secretary. The place of meeting will, as usual, be determined by the Sister Society, the Ophthalmological.

REPORT ON THE PROGRESS OF OTOLOGY IN THE SECOND HALF OF THE YEAR 1883.

Translated by Dr. C. ZIMMERMANN, of New York.

I.—NORMAL AND PATHOLOGICAL ANATOMY AND HISTOLOGY OF THE ORGAN OF HEARING.

By H. STEINBRÜGGE, of Heidelberg.

1. Prof. E. ZUCKERKANDL, of Graz. To the morphology of the musculus tensor tympani. *Archiv f. Ohrenheilkunde*, vol. xx., No. 2, p. 104.

2. Dr. VON MONAKOW, physician in St. Pirminsburg (Switzerland). Experimental contribution to the knowledge of the corpus restiforme. *Archiv f. Psychiatrie*, vol. xiv., No. 1, p. 1.

3. Dr. C. F. W. ROLLER, of Kaiserswerk. About the ascendant root of the auditory nerve. *Archiv f. Psychiatrie*, vol. xiv., No. 2, p. 458.

4. Dr. WILLY MEYER, Assistant Surgeon to the Surgical Clinic of Bonn. A contribution to the malformations at the first branchial arch and fissure. *Langenbeck's Archiv*, vol. xxix., No. 3.

5. Dr. C. M. HOPMAN, of Cologne. The papillary tumors of the mucous membrane of the nose. *Virchow's Archiv*, vol. xciii., No. 2, p. 213.

6. ARTHUR BOLLER LEE. Remarks on the structure of the chordotonal organs. *Archiv f. microscop. Anatomie*, vol. xxiii., No. 1, p. 133.

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1. The author refers to the investigations of Magnus, upon the musculus tensor tympani (published in *Virchow's Archiv*, vol.

xx.), and agrees with the latter in regard to the anatomy of the muscle and its insertion ; whereas, in regard to its function, he attributes a more extensive power to the muscle than Magnus does. His results are as follows :

a. The greater (lateral) portion of the tensor tympani passes over into the tendon of the muscle ; therefore the hammer always answers the contraction of this portion of the muscle by a motion.

b. A smaller (medial) portion of the muscle (varying in size, does not pass over into the tendon of the tensor, but is inserted into the processus cochlearis of the external surface of the petrous bone.

c. The tendon of the tensor is united with a ligament, extending from the processus cochlearis to that part of the hammer where the tendon of the tensor also is inserted. This ligament is to be called "intermedial ligament," according to Magnus.

d. Some fasciculi of the tendon of the tensor proper are so closely inserted into the processus cochlearis, that they remain as a tensely stretched ligament with the intermedial ligament, even after excision of the whole muscle.

To find out the function of the medial portion, inserting itself into the processus cochlearis, Zuckerkandl investigated the auditory apparatus of the dog, hare, deer, horse, roe, cattle, sheep, and pig. The tensor tympani appears more spherical in these animals, is thicker than the human, and is enclosed in a depression of the petrous bone. In some of these animals there is another (lateral) portion of the muscle in addition, extending to the tube, called pars tubaria by the author. The latter consists always of muscular tissue ; the portion enclosed in the depression contains only few thin muscular fibres, and consists mostly of fat and connective tissue. The tensor of the dog forms the only exception —having no pars tubaria. Man has the pars tubaria only.

Zuckerkandl agrees with Gegenbaur in regard to the morphological category of the tensor—viz., that it corresponds to a facial muscle of the lower vertebrates, in the same way as the two first ossicula are homologous to facial bones of the lower vertebrates. It is not decided yet which facial muscle comes into question ; authors also differ in regard to the homology of the hammer and incus.

The fatty degeneration of the spherical portion of the muscle has not to be ascribed to the domestication or fattening of the

animals (*e. g.* in the pig), as it is observed also in animals not fattened. The author inclines rather to consider the fatty portion of the tensor as a remainder of a (jaw) muscle entirely out of activity, of which only such a quantity of muscular substance is left, as the function of the hearing organ requires. Finally, Zuckerkandl thinks the medial portion of the human tensor, inserted into the wall of the labyrinth, with the fixed portion of the tendon and the intermedial ligament, might be considered homologous to the fatty muscle in animals, especially as a depression sometimes is found at the hindermost part of the muscular canal suggesting the muscular receptacle in animals.

2. MONAKOW succeeded in keeping alive a rabbit, of which the left half of the spinal cord was cut through immediately below the pyramidal decussation. The animal, at first paralyzed on the left side, recovered gradually, and was killed six months later. The description of the atrophy of different fibres and the anatomical conclusions from it are given in detail in the original paper; it will suffice to communicate only the results in regard to the auditory nerve. The most important was, that the auditory nucleus, consisting of large cells (Deiter's nucleus according to Laura; nucl. lateral., Stieda-Schwalbe; external acoustic nucleus, Meynnert–Clarke), had entirely disappeared, a few ventral and medial ganglion cells excepted. The fibres of the anterior root, and partly the inner portion of the posterior root arise from this nucleus according to most authors. The left roots of the auditory nerve, however, had the same size and number as the right. The preparations did not show whether fibres of the auditory nerve enter into the corpus restiforme.

The supposition that Deiter's nucleus is an auditory nucleus is entirely wrong, according to Monakow; it is rather connected with the spinal cord and is to be considered a nucleus of the funiculus cuneatus. The supposition, that it represents a kind of centre of coördination, would be quite legitimate, as this is the function of the funiculus cuneatus. The assertion of Roller, that the fibres coming from the funiculus cuneatus (described by him in these ARCHIVES, vol. x., p. 76), are an ascendant acoustic root, is confuted by the proof that Deiter's nucleus is not connected with the auditory nerve.

3. ROLLER defends his former statements in regard to the ascendant root of the auditory nerve against Monakow, showing that the bundle, described by him as the ascendant root of the audi-

tory nerve, remained intact in spite of the atrophy of the cells of Deiters' nucleus. He had concluded from his former investigations that only a portion of the mentioned bundle possibly joined the ganglion cells of the nucleus, but the remainder entered the inner root directly. The roots of the auditory nerve remaining intact, Deiters' nucleus being destroyed, therefore did not invalidate his deduction.

4. An abstract of fourteen cases of malformation of the auditory organ is given, in which the abnormities mostly affected the parts developing from the first branchial fissure and the first and second branchial arches. The case, observed by the author himself, was a man, otherwise perfectly normally developed, who died from a villous cancer of the bladder. The malformation was confined to the right organ of hearing, showing, *primo loco*, a rudimentary auricle (see the details in the original paper) in the upper part of which there was a fistula 2 *mm.* deep. Cartilaginous meatus 5 *mm.* long. The pyramis of the petrous bone seemed to be diminished in sagittal direction and thickness but enlarged in length. Os tympanicum, rudimentary. Processus styloideus, more inward and backward. Fissura Glaseri, slightly marked. Fossa jugularis, very deep. Osseous meatus, shortened and narrowed, with anterior convexity, its calibre changing very irregularly; the wall at the fossa glenoidea thin, above 1.5 *cm.* thick. Drumhead, even, thick, little transparent, height 5 *mm.*, inclination about 40°. Tympanic cavity, moderately lessened in size. The ossicula are rudimentary, situated in the upper anterior portion of the tympanic cavity, fastened by a narrow, osseous bridge. They seem to be parts of the malleus and incus, not far enough backward. Stapes and musculus stapedius are wanting. Semicanalis tensoris tympani, hyperostotic. Tendon of the musc. tens. tymp., extending to the posterior rudiment of the ossicula. Ost. pharyng. tubæ osseæ, pretty narrow, 8 *mm.* distant from the lower opening of the carotid canal. Fenestra ovalis and rotunda exist, a membranous closure of them not noticeable. Mastoid cells small, inner ear perfectly normal, its cavities somewhat narrowed on account of the compactness of the bone. Meatus aud. int., inward covered, begins as a semicanal; 6 *cm.* long. Auditory and facial nerves of the same size as the right. Left external ear, meatus, and petrous bone normal. Lower jaw symmetrically formed. The patient always heard worse with the right ear. The malformation is congenital. The

author recalls the fact that these anomalies of development take place in the first weeks of fœtal life, and that it is not a simple defect, but the result of irritation and inflammatory process in a certain district. The first and second ossicula, situated outside the tympanic cavity in an early stage of development, according to Kœlliker, were rudimentary and arrested in their progress to their normal situation. Concerning the development of the stapes the author follows Salensky's opinion, that it is to be considered an independent centre of cartilage-formation in the district of the first visceral arch, as the face is normally formed and the processus styloideus is present. The author is right in adding, that malformation of this kind can never give a distinct idea of the physiological process of development, as the irritative alterations are not always confined to a branchial arch. Finally he reminds us that these malformations occur more frequently on the right side than on the left, (*cf.* Welcker), a fact not yet explained. The question is only shifted if we recur for explanation to the frequently observed asymmetry of both halves of the body. At the end Meyer mentions from literature several cases which prove that the hearing might be fair in spite of external malformations if only the labyrinth is intact, the vibrations being conducted by the cranial bones.

5. HOPMAN found 76 mucous polypi, 10 harder fibromata with angio-adenomatous tumors, 13 papillomata, and 1 epithelioma, among 100 nasal tumors. The author states that papillomata are not mentioned in the papers of Billroth, Friedreich, Semeleder, and Czermack, and gives a review of the opinions advanced in regard to these tumors by Virchow, Lücke, Förster, Roser, Weber, Klebs, and Rindfleisch. He says that modern rhinologists describe the nasal polypi according to Billroth's well-known monograph. Fourteen personal cases are reported, and one of a benign epithelioma. The formation of the papillæ takes place by the epithelial layer growing into the tumor in the form of cones, with intermingled septa. These afterward decay in the centre, and cause manifold indentations at the surface. Sometimes there are proliferating glandular parts, a considerable development and ectasis of the vessels, an infiltration with small cells in the fibrous or alveolar framework of the tumors, so that some of them might be called adenoma, angioma, or fibro-sarcoma papillare. The author prefers the name papilloma, from clinical reasons. The tumor called epithelioma papillare was exactly like Billroth's vil-

lous cancer of the nasal mucous membrane, but turned out favorably. The tumor obstructed both nasal cavities, raising cartilage and soft parts, caused partial atrophy of the bones, and an eversion of the nose (according to Demarquay and Von Bruns); it was constricted in portions and removed by cauterization. Scraping out the ethmoidal bone, cauterization with chloride of zinc, recovery by first intention. The tumors weighed 54 grms., showed a fibrous vascular stroma penetrated in every direction by club-shaped or longitudinal epithelial cones, communicating with each other, and representing the predominant mass of the tumor in comparison with the connective tissue, the vessels, and the large polygonal or oval neucleated cells of the pavement epithelium. After several slight relapses it ended in perfect recovery, with no return in two years (the time of this publication). The author thinks the difference between the papillomata and the mucous polypi is that the latter have always a smooth surface, contain a good deal of albuminous serum, shrivel in alcohol, assuming an opaque white-yellowish color, and leaving a piece of mucous membrane by bruising. The mucous polypi are poor in glandular tissue (contra Billroth) and in cysts, and never originate in the lower turbinated bones. The papillomata represent a tight or loose papillary excrescence with a broad base, the surface of which shows short pedunculated berries, or thickly set small papillæ. Both forms are frequently combined. Their site is always at the lower turbinated bone. The limit is not easily to be drawn between the frequent hypertrophies of the mucous membrane of the lower turbinated bone and the real neoplasms. Chronic nasal catarrhs, commonly considered to be a cause of the neoplasms, occurring so frequently without any such formations, a certain predisposition has to be assumed. This supposition is supported by a report of three cases with syphilitic dyscrasia. In regard to the symptoms, he says, that there is generally a chronic rhino-pharyngitis, besides the papillomata of the turbinated bone, with predominating pharyngeal disturbances, continuation of the inflammation to the larynx and trachea. Coughing in the morning, and eructation of phlegm give rise to the supposition of an affection of the respiratory organs. Hopman uses the Duplay-Charrière screw-speculum for the examination. The prognosis is generally favorable, although relapses may be expected. The author uses Blake's polypus snare, modified by Zaufal, and a galvano-caustic snare especially constructed for

that purpose. The latter does not always prevent the bleeding, and the cold snare has the advantage, of being a handier instrument. After-treatment with simple absorbent cotton and insufflation of iodoform. Snuffing of water, not the douche, is used.

(6) LEE, in his investigations upon Diptera-larvæ, follows Graber in regard to the terminology (These ARCHIVES, vol. xi., p. 255 and following), but came to other results in regard to the morphology of the chordotonal organs. Commonly the rods of the above-mentioned organs are described as conical bodies, terminating at the proximal end in a point, which passes over into the so-called chorda, an axial thread connected with a ganglion cell. Lee, however, found that they have no point, but terminate in a tube, enveloping an axial thread, with the proximal end. The rod represents thus not a terminal swelling of the nerve-fibre, but only a capsule of it. The author calls this capsule "apical utricle." If it collapses, it leaves a solid string, the "chorda" Graber's. Neither the capsule nor the axis fibre could be followed up to the ganglion cell, but the distal end of the thread could be discovered in a terminal bud situated right below the end of the rod. This bud seems to be hollow, is hemispherical or elongated, and then somewhat constricted in the middle, and probably passes over into the lumen of the cephalic canal. The head of the rod was slender, consisted of two parts, not simply cylindrical or conical, in all larvæ. The so-called distal chorda is found on all chordotonal rods, therefore Graber's distribution into amphinematic and mononematic rods has to be abandoned, since all are amphinematic.

The fixing ligament is always a tube with thin walls, sometimes double, and minutely striated lengthwise. It contains a clear liquid or a varying quantity of a highly refracting substance, is inserted into the head or envelopes the whole rod, extending farther in a proximal direction. The whole arrangement is probably so that a tube, proceeding from the capsule of the ganglion cell, enveloping an axis-fibre, swells to a rod-body and terminates, lessened in size, at the integument as distal chorda. The head seems to be an annular thickening of the rod and to serve for the insertion of the terminal bud of the nerve.

The truncal chordotonal organs, as a rule, have a paired arrangement, a polyscolopic and a monoscolopic system existing in every segment.

II.—PHYSIOLOGY OF THE EAR AND PHYSIOLOGICAL ACOUSTICS, IN THE YEAR 1883.

By OSKAR WOLF, of Frankfort-a-M.

1. Lucæ, Professor in Berlin. Lecture on the resonance of the pneumatic cavities of the auditory apparatus. Transactions of the Physiol. Society of Berlin, No. 9, 1882–83.

2. Dr. Frederic Bezold, Instructor at Munich. The closure of the Eustachian tube, its physical diagnosis and influence upon the function of the ear. *Berliner klin. Wochenschrift*, No 36, 1883.

3. Pedrono. Udizione colorata. *Gaz. Ital.*, Lomb., 1883.

4. Vulpian. Experiments on the disturbances of motility caused by a lesion of the auditory apparatus. *Gaz. hebd.*, 1883, 3. *séance de l'Académie des Sciences*, 1883, 8th January.

1. Turning the ear toward the wind (*i. e.*, if it is blown into like a resonator, Rev.) one perceives a pretty low noise, accompanied by some higher tones. The fact that, on pressing the auricle slightly to the skull, this noise decreases, but is not essentially changed in its quality, shows, according to the author's opinion, that it is brought about by a resonance of the deeper parts of the ear. Since the tone proper to the "meatus-drumhead," is very high (viz., in the four-times marked octave), another portion has to accompany its vibrations, namely: the "tympanic-cavity and mastoid cells," even if a lower resonant tone should be produced. Lucæ proved by the following experiment that this lower resonant tone is mostly produced by consonance of the pneumatic cavities of the middle ear. If a glass pipe, 6 *cm.* long, which, if blown separately, gives c^3, is added air-tight to a spherical resonator tuned to c^1, the fundamental tone of the apparatus becomes much lower—it descends to H. If now a stretched membrane is placed between both parts the proper tone of the apparatus is raised to about f^1. The proper tone becomes the higher the more the membrane is stretched.[1] This apparatus corresponds to the system "meatus, drumhead, middle ear, mastoid cells" in regard to its resonance, only with the difference that the "mastoid-tympanic cavity" does not form one large cavity, as the globe of the resonator, but a system of pneumatic cells, commu-

[1] Rev. has set forth this condition of curved membranes in his "Membranversuchen," and shown that a pretty low tone of strongest resonance exists for one ear besides the very high proper tone of the portion "meatus-drumhead." Compare: "Speech and Ear," pages 196 and 215.

nicating one with another, like those of a sponge. Lucæ, therefore, filled the globe of the resonator with dry sponges and repeated the experiment. The remarkable fact resulted, that the resonator did not lose its original tone, c^2, although the resonance was now decreased. Lucæ showed further at the dead subject that, after removal of the drumhead, the tone of the ear was much lowered (almost one octave), so that by blowing into this ear a lower noise is heard than by blowing into the intact ear. By removal of the other drumhead both ears are tuned equal again.

2. BEZOLD discusses the origin of the normal cone of light at the drumhead, after considering the causes of closure of the tube and its clinical features. He, like most authors, thinks that it is the direct reflex of an obtuse-angled funnel. Why the cone of rays always appears in the same direction in the anterior-lower quadrant of the drumhead, he explains as follows: "Politzer showed that after removal of the meatus, the triangular reflex runs over the whole outer surface of the drumhead by turning it gradually, but we perceive a reflex from that portion only which is perpendicular to our visual line. The invariable position of the reflex thus depends upon the inclination of the drumhead and the direction of the meatus, to which our visual line has to be adjusted. The outer surface of the drumhead looks downward and forward, as the drumhead is inclined in a double manner, its upper and its posterior periphery being more lateral. If the surface of the funnel were inclined downward alone, a triangular reflex could only appear vertically downward; if it looked forward alone, the reflex could only be horizontal. As, however, the drumhead has an intermediate situation, a reflex from a funnel lies between the vertical and horizontal directions—*i. e.*, forward and downward. On a section through the axis of the meatus, dividing the reflex into two halves in its length, we easily see that only the region of the reflex, is perpendicular to our visual line." A very instructive drawing illustrates the different situations of the drumhead during rest, rarefaction or condensation of air, and the corresponding changes of the reflex. When the drumhead bulges forward, the normal reflex becomes broader, more indistinct, and shorter; when it sinks in, approaching more the funnel-shape, the reflex becomes longer, and thinner at its basis. We see this form seldom, because the membrane soon sinks *in toto*, if the tube is constantly closed, and assumes the form of a kettle. Then the former reflex can, of course, not retain its triangu-

lar form, but it passes over into the real image of a concave mirror. As a reflex from a concave surface, it moves more and more to the periphery, and exhibits a very characteristic symptom for closure of the tube. Sometimes we miss the reflex, just described, in closure of the tube. Bezold explains it, that the position of the drumhead is in an intermediate stage in those cases, between kettle and funnel, if the radial fibres are not sufficiently stretched. In this case our optic axis strikes no portion of the drumhead perfectly vertically, so that no reflex appears. The transformation from the funnel shape into the kettle shape is confined only to the middle portion of the drumhead, the peripheric zone obtaining its position so that an annular bent is produced, giving a linear reflex in front and below (Politzer). Then the origin of the various smaller reflexes at the processus brevis and the membrana Shrapnelli is explained. Bezold points out that the anomaly in the function, which arises in closure of the tube, is due mostly to the difference of air-pressure in the tympanic cavity and the external atmosphere, and not at all chiefly by the changed form of the drumhead. This difference of air-pressure causes a great anomaly in the unstable equilibrium of the entire apparatus, which, on a small over-pressure, does not conduct the vibrations exactly any more, as in the normal state it is regulated by antagonistic forces. No wonder that the acuteness of hearing decreases even to $\frac{1}{200}$ of the normal by increase of one-sided increase of pressure.

3. PEDRONO recognizes the fact that, with perception of certain musical tones, the perception of corresponding colors is connected. To explain this phenomenon (perhaps pathological, according to the author) he assumes an aural and a visual centre (un centro cerebrale auditivœ visivo) in the gray cerebral substance situated very near to each other. It is an irradiated or associated central perception.—MOOS, REV.

4. On injection of a 25 % solution of chloral hydrate into the ear of a rabbit, peculiar motor disturbances set in after a quarter of an hour, reaching their maximum one day after the operation: giddiness, oscillation of the head, turning of the body round its vertical axis, and rolling movements. The eye of the operated side looks downward, the other upward. Both eyes showed vertical nystagmus. The facial nerve of the operated side was paralyzed. Every excitement produced rolling movements. The symptoms gradually diminished after a few days, the paralysis

of the facial nerve excepted. *Post-mortem examination.*—Destruction of the drumhead, pus in the tympanic cavity, hyperæmia and beginning suppuration in the labyrinth. Not the least alteration of the cranium, or the brain and its membranes.

Result.—Chloral penetrates rapidly through the drumhead and both fenestræ of the labyrinth, and acts upon the semicircular canals and the cochlea.—Moos, Rev.

III.—PATHOLOGY AND THERAPEUTICS OF THE ORGAN OF HEARING.

By A. HARTMANN, of Berlin.

GENERAL.

1. Dr. K. Bürkner, of Goettingen. Contributions to the statistics of aural diseases. *Arch. f. Ohrenheilk.*, vol. xx., p. 81.

2. Medicinalrath Dr. Hedinger, Stuttgart. Clinical reports of the Aural Institute of Stuttgart, 1880–'82, etc. E. Schweizerbart, publisher, 1883.

3. Prof. E. de Rossi, Rome. XII. anno di insegnamento della otojatria. XII. school year of otology, 1883.

4. A. Eitelberg, Vienna. Upon the influence of hearing exercises upon the sense of hearing of the exercised, and especially of the other, not exercised, side. These Archives, vol. xii., p. 266.

5. G. Brunner, Zürich. On the etiology and symptomatology of so-called autophony. These Archives, vol. xii., p. 338.

6. E. E. Holt. Acuteness of hearing under various conditions. *Trans. of the Am. Otol. Soc.*, 1883.

7. Medicinalrath Dr. Hedinger, Stuttgart. The aural diseases of the railway employees. *Deutsche. med. Wochenschrift*, No. 27, 1883.

8. C. J. Kipp. On the connection of aural diseases with synchysis scintillans of the vitreous. *Trans. of the Am. Otol. Soc.*, 1883.

9. Weber-Liel. On the influence of sexual irritations upon affections of the organ of hearing. *Monatschr. f. Ohrenheilkunde*, No. 9, 1883.

10. Dr. SCHWABACH, of Berlin. On hereditary syphilitic affections of the ear. *Deutsche medicinische Wochenschrift*, No. 38, 1883.

11. BERTHOLD LEWIN. Boracic acid and its modern use in practice. Inaug. Dissert., Bonn, 1883.

12. F. B. EMERSON, New York. The test of hearing with the tuning-fork. These ARCHIVES, vol. xii., p. 62.

13. SAMUEL SEXTON. Conduction of sound to the ears through the tissues in aural disease. *N. Y. Med. Record*, July 28, 1883,

14. Dr. EITELBERG, Vienna. On massage in ear-diseases. *Wiener med. Presse*, No. 26, ff., 1883.

15. Prof. ZAUFAL. Massage of the ear. *Prager med. Wochenschrift*, No. 44, 1883.

16. Dr. HEDINGER, of Stuttgart. The forensic significance of hemorrhages in the ear. *Wurtt. Correspondenzblatt*, No. 35, 1883.

17. J. A. ANDREWS. The diagnosis of cerebral complications in ear disease with the ophthalmoscope. *Trans. of the Amer. Otol. Soc.*, 1883.

18. Dr. BEZOLD, of Munich. A medico-legal case of injury to the ear with a pointed instrument, the patient being accused of simulation and perjury. *Berliner klin. Wochenschrift*, No. 40, 1883.

19. Dr. C. MULLER, of Wiesbaden. Two cases of paralysis of the trigeminal nerve. *Arch. f. Psychiatrie*, vol. xiv., No. 2.

20. AUGUST LUCAE. The spray ("Wasserstrahlgebläse") and its application as an air-douche. *Arch. f. Ohrenheilk.*, vol. xx., p. 161.

21. F. P. NORRELL. Deafness among pupils. *Trans. of the Amer. Otol. Soc.*, 1883.

22. CHARLES G. LEE. Remarks on visual disturbances in deaf-mutes. *British Med. Jour.*, Dec. 15, 1883.

23. Dr. HEINRICH BIRCHER, of Bern. The endemic struma and its relations to deaf-mutism and cretinism. With three plates. Basel, 1883.

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(1) BÜRKNER has arranged the material of different reports containing together 58,645 cases, but frequently classified from different points of view, into six tables, from which he draws the

conclusion that ear diseases are more frequent in the middle age of life and in men than in youth and old age, resp. in women, and are mostly the consequence of colds, infectious diseases, and affections of the naso-pharynx. The acute affections of the middle ear are more frequent in the spring and winter than in autumn and summer. Sixty-seven per cent. of all diseases are those of the middle-ear, twenty-five per cent. external, eight per cent. internal ear.

(2) HEDINGER reports over 3,139 ear-patients, treated from 1880–1882. The various affections are discussed separately, and a great number of interesting clinical histories are given. The assertion appears striking, that cerumenal plugs are frequently observed together with vegetations of aspergillus, whereas Siebenmann, whose paper is cited, proved that aspergillus does not vegetate upon cerumen. It would lead too far to raise doubts on many opinions expressed in this paper, on some erroneous conceptions of papers of other authors, and on a few slips of the pen, such as "neuralgia of the facial nerve," etc. Some parts of the paper—viz., the results of examinations of deaf-mutes and railway employés—have been published before.

(3) ROSSI reports 611 diseases in 578 patients during one year: 117 affections of the external ear; 423 of the middle ear; 21 ear-polypus, caries, and necrosis of the temporal bone; otalgia 2; diseases of the internal ear 32. He adds a communication of a great number of observations in detail, among which are some remarkable.

(6) HOLT examined (1) 24 persons with chronic, not suppurative, catarrh of the middle ear; (2) 24 machinists; (3) 24 boiler-makers; (4) 24 persons with normal hearing. In the first he found that the tuning-fork was heard 2.2 times longer through the air- than through the bone-conduction, and the upper limit for König's rods was an average of 35,000 vibrations. In the second the tuning-fork was heard 2.5 times longer through the air- than through the bone-conduction, and the upper limit for König's rods was 40,000 vibr. In the third, t.-f. 2.4 times longer through air- than bone-conduction, and the upper limit for König's rods was 39,000 vibr. In the fourth, t.-f. 3.7 times longer through air- than bone-conduction. He found that the acuteness of hearing for voice and watch decreased in the same rate as for air- and bone-conduction. He thinks that the weakened hearing in machinists and boiler-makers is due to a defect in the sound-

conducting apparatus. He does not believe that they hear better during a noise. S. M. BURNETT.

(7) HEDINGER compares the occurrence of diminished hearing in railway employees according to the special employments. He examined 564 persons. For brakemen and switchmen the proportion is the most favorable, for conductors and line-keepers the most unfavorable, according to table I. These statistics do not entitle to a conclusion upon the influence of the different occupations upon the difficulty of hearing on account of the very different age of service.

In table II. he considers the different employments separately, according to the age of service resp.; he puts together the number of persons with different hearing, of different occupation, but of the same length of service, and in table III. he investigates the decrease of hearing-distance, according to single years of service, but divided into categories of employment. The result was, that, with small fluctuations, the difference in decrease depended not upon the occupation, but upon the length of service. There is a progressive decrease of hearing in railway-employees, remaining far behind the corresponding decrease of machinists, which is not greater than the decrease in common life. It is a sclerotic form of chronic catarrh of the middle ear, most frequently a consequence of a chronic affection of the pharynx; there was not one affection of the labyrinth among the five hundred and sixty-four cases. Subjective noises occurred seldom.

(8) Six cases are reported by KIPP, in which synchysis of the vitreous existed with deterioration of hearing. In the following discussion Little, Webster, and Knapp stated that they never observed any such connection. S. M. BURNETT.

(9) Affections of the uterus, irritating and normal processes in sexual life have frequently quite an unfavorable influence upon an existing ear disease, according to WEBER-LIEL. Slight affections change their character by reflex action, motor or sensitive or vasomotor disturbances developing within the middle ear. The local treatment is unsuccessful as long as the irritation from the uterus exists. If the irritation has subsided, the special character of the affection ceases. The pain in the last dorsal and first lumbar vertebræ is never wanting in those cases. Masturbators, especially women, prove the influence of the sexual sphere upon existing ear diseases, so that the practice of masturbation may be diagnosed from the peculiar course of the ear disease. Under the same in-

fluence otorrhœa is very obstinate, and cure is very tedious Progressive difficultv of hearing with noises, especially in women and old maids, often has this same cause, and defies every treatment, the electric perhaps excepted. Marriage ought not to be recommended to delicate and excitable women afflicted with difficulty of hearing, since all sexual excitements deteriorate the aural affection.

(10) SCHWABACH observed sudden vertigo, noises, and great diminution of hearing in two cases treated for parenchymatous keratitis. The examination revealed in both an affection of the labyrinth. The clinical history gave in the first case none, in the second only slight points for the syphilitic nature of the affection. Schwabach, therefore, refutes the opinion that an hereditary syphilitic affection has to be thought of, without hesitation, in all cases where an inflammatory affection of the eye is followed by deafness, noises, and vertigo. He illustrates this by a third case, where nearly complete deafnesss occurred after granulous ophthalmia, without the parents of the patient ever having suffered of lues.

(11) LEWIN gives at first an accurate history of the application of boracic acid and the knowledge of its chemical qualities, then discusses its occurrence in nature, the different systems of its preparation from the fumaroles, its chemico-physical properties, the doses and mode of application of the bor. preparations, and reports then a series of experiments in which fibrine of blood was exposed to the air with bor. solutions of different concentration. The result was, that solutions of bor., stronger than 0.5 % prevent, invariably, formation of bacteria and putrefaction, but not the formation of mould. Studying the exposed mesenterium of a frog after touching it with a 4 % solution of boracic acid, Lewin found that boracic acid stops the pathological immigration of blood-cells into the tissue of exposed membranes and parenchymatous organs, after direct application upon the exposed organ as well as probably after hypodermatic injection. What he gives in regard to the use of boracic acid in surgery, ophthalmology, and otology is well known.

(13) If a tuning-fork, placed on the teeth or vertex, is heard better on one side it does not prove, according to SEXTON, that one of both auditory nerves is affected, but shows that the better ear excludes wholly or partly the conduction through the tissues. Is the conduction of sound normal on one side, but impeded on

the other, the conduction through the air is without effect in the diseased ear, whereas the tuning-fork, put to the vertex, is heard better in the affected ear and almost not perceived in the healthy ear. In an affection of the labyrinth with normal middle ear the tuning-fork is, if at all, heard best through the air-conduction, the bone-conduction being abolished. Therefore the tuning-fork is of less value for the differential diagnosis, than it was supposed.

S. M. BURNETT.

(14) EITELBERG uses successfully thin, in a later stage thicker, drainage-tubes, without any other medication, acting only by pressure, in idiopathic circumscribed inflammations of the auditory canal and in those swellings of the aural canal caused by retention of discharges in the middle ear. Massage, in a more limited sense, *i. e.*, rubbing and pressing the mastoid process with thumb and index in the direction of the line of insertion of the auricle, was used in acute and subacute catarrh of the middle ear, when roaring, subjective noises, and headache coexisted. The author concedes, however, that this application may only be recommended as a palliative against headache and vertigo. Subjective noises are only distinguished for a short time, but increased if massage is continued any longer. Several cases explain it (10).

(15) ZAUFAL saw good results from massage of the ear in three cases: a chronic eczema, with thickening of the auricle, healed after striking the auricle and the lateral region of the neck. In an infiltration of the insertion of the sterno-cleido mastoid muscle after otorrhœa, ice was applied in vain, but after the first massage an amelioration was noticeable. In a third case a deep purulent infiltration under the sterno-cleido mastoid muscle decreased after massage, repeated several times, which did not cease after opening of the mastoid. Zaufal recommends massage also in affections of the tympanic cavity, and tried even the massage of the cartilaginous tube.

(16) In cases of aural hemorrhage, bone-conduction, condition of drumhead, disturbance of equilibrium, vomiting, subjective noises have to be considered in the prognosis, according to Hedinger. The quantity of blood indicates neither its seriousness nor the place of its origin.

(17) ANDREWS describes four cases of otitis media purulenta, complicated with cranial abscess, ending fatally (except one), in which the ophthalmoscopic examination showed inflammation of the optic disc. In the following discussion some, especially Kipp

and Knapp, communicated their experience in regard to the value of the ophthalmoscopic examination in such cases. They all agreed, that neuritis optica makes its appearance only when complications of the brain are established which do not always end fatally. S. M. BURNETT.

(18) A son of a farmer was stabbed in his left ear with a knife. The injury was followed by a considerable outflow of blood from the ear, mouth, and nose. After a few hours he vomited a considerable quantity of swallowed blood. A horizontal wound, extending from outward and forward, inward and backward, led into a canal piercing the anterior wall of the tragus, behind the maxillary joint, proceeding into the pharynx. The wound healed by first intention. Pain in deglutition and a small partial anæsthesia of the face soon subsided. After a fortnight there was only some roaring, but it became very violent after six weeks, and was followed (according to the patient's statements) by almost complete deafness. As the case led to a forensic examination, and the medico-legal examiner pronounced his complaints simulation, the injured was accused of perjury, and came under the observation of BEZOLD, for expert testimony, nine months after the injury. B. found the external meatus normal, with exception of the scar; all symptoms of a deeply sunken drumhead with immobility, normal pharyngeal opening of the tube, absolute impermeability for air, and a firm closure 14 *mm.* above the opening, ascertained by a whalebone probe; great diminution of hearing. It represented a cicatrization with absolute closure of the tube by traumatic lesion of continuity. The author discusses in detail the anatomical conditions for such an injury, and thinks this hemorrhage to be caused by a lesion of the carotis interna.

(19) In the first of the two cases, given in detail by MÜLLER the chief symptoms are: affection of the sensative portion of the right trigeminus nerve and paralysis of the gustatory fibres of the anterior two thirds of the right half of the tongue. Since the motor fibres of the third branch are free, the disease can only affect the sensitive portion of the ganglion Gasseri, or be situated more central, the trophic fibres for eye and ear being intact. The chorda fibres are of course also affected, as running within the trigeminus toward the centre. The second case is a paralysis of the three branches of the left trigeminus, which produced a neuroparalytic ophthalmia and otitis. An affection of the right tri-

geminus followed, with roaring and pain in the ear. But there was no reason to take it for a neuroparalytic otitis in the right ear, because Dr. Oscar Wolf found previously a depressed drum-head, and there was a considerable paralysis of the muscles of the tube. Müller considers the ganglion Gasseri as the seat of the paralysis, (on the left as well as on the right side,) and thinks that otorrhœa was brought about by paralysis of the trophic fibres, starting from there, as in Hagen, Berthold, Baratoux, and Kirchner's cases, after cutting the trigeminus.

(20) LUCAE describes the spray ("Wasserstrahlgeblæsse") used for the air-douche at the Berlin ear clinic. The air-pressure of the apparatus can be regulated, and a variably strong and constant current of air is obtained for the air-douche. Lucae uses it for catheterism and Politzer's method.

(21) NORREL examined 491 children; 72 had diminution of hearing in both ears, 53 in one ear. S. M. BURNETT.

(22) LEE examined 110 pupils of the Liverpool Institute for Deaf-Mutes, in regard to their acuteness of sight; 64 were emmetropic. Of the remaining 46: 30, hypermetropic; 3, myopic; 2, anisometropic; 11 other errors of refractions; corneal opacity, 2; cataract, 2; chorioiditis, 1; retinitis pigmentosa, 6. Color-blindness in none of the 58 cases. Only in two cases distinct signs of hereditary syphilis. The six cases of retinitis pigmentosa were connected with congenital deafness, and came from four families. In two of the families the parents were blood-relations. No congenital syphilis in any of these cases existed. The author recommends to examine the visual disturbances of the deaf-mutes, and to remove them if possible.

(23) BIRCHER thinks, from his investigations and inquiries on the presence of deaf-mutism in Switzerland, that the division into congenital and acquired deaf-mutism is wrong, and distinguishes a sporadic and an endemic deaf-mutism. In Switzerland deaf-mutism has an endemic spreading parallel to the endemics of struma. Bircher showed that these endemics are related to geological formations of the soil; they occur only on marine deposits of the trias and tertiary epochs. The primitive mountains, the sediments of the Quaternary sea and of the fresh waters are free of them. According to extensive examinations in Swiss institutions of deaf-mutes, Bircher concludes, that in Switzerland about 20 % of all deaf-mutes belong to sporadic, 80 % to endemic, deaf-mutism. He believes, that intrauterine alterations of the

centres of hearing and speech occur under the influence of the endemic pathological conditions. The endemic deaf-mutism may be congenital or acquired in the first years of life. In regions of endemic deaf-mutism the disturbance of speech prevails over the disturbance of hearing, so that the defect of speech might be supposed to be a consequence of a primary affection of the centre of speech. It has to be left undecided, whether in endemic deaf-mutism the rod-shaped micro-organisms are essential, which Bircher found in the springs of districts abundant in goitre, and which were wanting in the wells of regions free of goitre.

EXTERNAL EAR.

24. W. W. SEELY. A case of primary epithelioma of the auricle. *Trans. of the Am. Otol. Soc.*, 1883.

25. G. P. FIELD. Exostosis eburnea in external meatus. Removal with the American dental machine. *Brit. Med. Journ.*, Nov. 24, 1883.

26. Dr. KÜPPER, of Elberfeld. Communication from practice. *Arch. f. Ohrenh.*, vol. xx., p. 167.

27. Dr. C. J. BLAKE. Accumulations of epidermis in the external meatus. *British Med. and Surg. Journ.*, May 11, 1883.

28. S. SEXTON. A case of excessive itching in external canal during ten years, without local affection (pruritus auris). *Med. Record*, Dec., 1883.

29. Dr. CZARDA, Prague. A new ear-tampon improving the the hearing. *Wiener med. Presse*, No. 16, 1883.

30. THOMAS BARR. Practical remarks on the value of Yearsley's cotton pellet as an artificial drumhead. *Brit. Med. Journ.*, Oct. 13, 1883.

31. H. KNAPP. Unsuccessful attempt to reopen an aural canal closed after cauterization with concentrated sulphuric acid. These ARCHIVES, vol. xii., p. 154.

(24) SEELY'S patient, a man of sixty years, had his right ear bitten by a rat six years ago. The wound did not heal, but was gradually transformed into a large ulcerating growth, occupying the upper and posterior part of the ear. The whole auricle was removed with Paquelin's thermocautery. Nothing is said about the microscopic condition of the growth. S. M. BURNETT.

(25) FIELD'S patient suffered from otorrhœa for twelve years

after measles. The eburnean exostosis started from the posterior wall of the ear-canal, showed a rapid growth, and was operated upon with the American dental engine. The hearing improved after the operation, which lasted thirty-five minutes, and the secretion became less. Nothing is said about the condition of the ear-canal after the operation.

(26) Epilepsy caused by foreign bodies. A girl, eighteen years of age, suffered from pains in her right ear, beginning six weeks previous to observation, followed by abundant suppuration. Three weeks ago she put a piece of a root-wood into the same ear, in order to remove her toothache. She suffered since from frequent typical epileptic fits. KÜPPER himself observed one of them. The otorrhœa ceased after having removed a quantity of polypi on the first day, and on the second day the deep-seated foreign body, a hard piece of wood, 1 *cm.* long, by means of a hook (in narcosis). After the removal two epileptic fits occurred, but no further.

Symptoms of irritation of the brain by an epidermis plug. A lady, seventy-six years old, suddenly fell sick with headache, vertigo, vomiting, violent convulsions of the face and limbs, and pains in the right ear. All organs healthy, right ear deaf, external canal completely obstructed. On the attempt to remove the plug, vertigo, vomiting, and convulsions set in, which repeated later. The symptoms did not return after removal of the plug, which showed different layers of pavement epithelium. The drumhead was united with the wall of the tympanic cavity. The acuteness of hearing remained o after the removal.

(27) In the very rare cases in which the epithelial mass fills the canal, being fully degenerated in the centre, so that it is impossible to grasp the mass, or a part of it, with the forceps, BLAKE pierces a probe, covered with cotton immersd in caustic potash, into the substance. This transforms it into a soluble soapy substance, which is easily removed with the syringe. This procedure has of course to be repeated several times.

S. M. BURNETT.

(28) In this case SEXTON seems to have supposed that the cause was in the nervous centres with excentric projection through the aural branches of the V. pairs. The application of collodium cantharidatum upon small surfaces seemed to remove the trouble for some time. S. M. BURNETT.

(29) CZARDA twists a piece of cotton, presses its concavity

flat, and introduces it into the defect of the drumhead by means of the speculum. It acts as porte-remède, and as artificial drumhead in cases where his silk tympanum does not answer the purpose—*i. e.*, where a certain amount of fluid seems to be necessary for the artificial drumhead.

(30) The advantages of Yearsley's cotton pellet over Toynbee's artificial drumhead are: (1) The former is softer and acts with less irritation. (2) Proper astringents or other remedies can be applied with it. (3) It does not cause any disagreeable noises. (4) It can not be seen in the external orifice.

MIDDLE EAR.

32. Dr. BEZOLD, of Munich. The closure of the Eustachian tube, its physical diagnosis and influence upon the function of the ear. *Berliner klin. Wochenschrift*, No. 36, 1883.

33. LITTON FORBES. On the indications and the therapeutic value of myringotomy. *Brit. Med. Jour.*, Oct. 27, 1883.

34. Prof. F. GRUBER. Clinical contribution concerning the tenotomy of the tensor tympanni. *Monnatsschr. f. Ohrenheilk.*, No. 7, 1883.

35. Dr. WEBER-LIEL. Observations and therapeutics of aural vertigo. *Monnatsschr. f. Ohrenheilk.*, No. 11, 1883.

36. R. C. BRANDEIS, of New York. A case of objective noises in both ears, with synchronous movements of the drumhead and the palatal muscles. These ARCHIVES, vol. XII., p. 14.

37. Dr. JACOBY, of Breslau. Acute otitis media, with lardaceous infiltration of the mastoid region, and retention of pus in the antrum. *Arch. f. Ohrenheilk.*, vol. xx., p. 183.

38. SAMUEL SEXTON. Aural pain in children. *Med. Record*, May 5, 1883.

39. Dr. BERG, of Ulm. An observation of a complete congenital fistula colli media. *Virchow's Arch.*, vol. xcii., 1883.

40. Dr. MÉNIÈRE. Rheumatism of joints, commencing in the ear. *Revue mens.*, No. 11, 1883.

41. Dr. A. MAGNUS. A case of complete transient deafness. *Arch. f. Ohrenheilk.*, vol. xx., p. 171.

42. Dr. MOURÉ, of Bordeaux. Probable fracture of the ossicula from an indirect violence. *Bulletins et Mémoires de la société française d'otologie*, etc., vol. i., p. 87.

after measles. The eburnean exostosis started from the posterior wall of the ear-canal, showed a rapid growth, and was operated upon with the American dental engine. The hearing improved after the operation, which lasted thirty-five minutes, and the secretion became less. Nothing is said about the condition of the ear-canal after the operation.

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43. Dr. ESCHLE. Bacillus tuberculosis in the discharge of purulent otitis media in phthisical persons. *Deutsche med. Wochenschr.*, No. 30, 1883.

44. Dr. HESSLER, of Halle. Contribution to the pathology and therapeutics of perforations of Shrapnell's membrane. *Arch. f. Ohrenheilk.* vol. XX., p. 121.

45. Dr. ROOSA. A lecture on the treatment of chronic purulent otitis media. *New York Med. Journal*, March 19, 1883.

46. Dr. POMEROY. A case of chronic otitis media suppurativa, illustrating the action of boracic acid. *The Planet*, July 15, 1883.

47. H. KNAPP. A case of very obstinate otitis media desquamativa, with final recovery. *Transact. of the Amer. Otol. Soc.*, 1883.

48. C. H. BURNETT. Affection of the mastoid. Artificial opening of the bone. Temporary relief. Death by pyæmia. *Trans. of the American Otol. Soc.*, 1883.

49. L. TURNBULL. Observations on caries of the mastoid in children. *Philadelphia Med. Times*, July 14, 1883.

50. W. F. MARTIN. A case of mastoiditis leading to phlebitis, with fatal issue. *New York Med. Times*, August 1883.

51. H. KNAPP, New York. Three serious cases of mastoid disease, with remarks. These ARCH., vol. xii., p. 44.

52. E. TILDEN BROWN, New York. A case of abscess of the mastoid, etc. These ARCH., vol. xii., p. 57.

(32) See above the physiological report by WOLF.

(33) FORBES discusses in detail the indications for myringotomy, which he wrongly terms myringodectomy (excision of the drumhead). He recommends a free incision, extending over the whole diameter of the drumhead. The indications given by him correspond in their essential parts to those generally accepted.

(34) GRUBER believes that the great importance of tenotomy of the tensor tympani has not nearly found its deserved acknowledgment. He has, as he states, performed the operation in relatively many cases with more or less good result.[1]

After Weber-Liel had alleged that vertigo, caused by affections of the ear, could be removed through tonotomy of the tens. tymp., the operation was performed by the author in such a

[1] Pollack saw Prof. Gruber perform the operation only once, during the five years while he was studying otology as assistant of the ear clinic of Vienna. *Allgem. Wien. med. Zeitung*, February, 1880, No. 46, ff.

case. The tinnitus disappeared after the operation. The watch, perceived before only on immediate contact, was heard at 28 *cm.* Violent fits of vertigo occurred directly after the operation and during the next days, disappearing after the healing of the wound in the drumhead.

(35) WEBER-LIEL reports a case where violent attacks of vertigo were permanently removed by tenotomy. The symptoms of vertigo were caused by a fall upon the occiput with hemorrhage from the ear which subsided after three weeks' confinement; they were so violent that the patient had to be supported. Energetic rarefactions of air in the external meatus produced a diminution of the noises and of the sensation of giddiness. The latter was entirely gone, immediately after the operation, without returning.

(37) An otherwise healthy and strong girl, nine and a half years of age, had purulent discharge from the left ear for three weeks, with pain for eight days, and for more than a week painful swelling of the mastoid region. In the meatus, which was swollen and narrowed, some offensive pus; small perforation, pain in the mastoid, vertigo in horizontal position. Paracentesis, antiphlogosis, and iodine applications not removing the offensive pus during five weeks after the beginning of the observation, a needle was thrust into the mastoid antrum, 2 *cm.* deep, after which some drops of viscid bloody pus were evacuated. An incision of the swelling down to the bone on the next day discovered no pus, but only compact lardaceous infiltration, detachment of the periosteum, and some roughness of the bone. Eight days later a deep incision was made in the swollen posterior wall of the meatus, and the paracentesis repeated. Purulent infiltration and necrotic exfoliation of the infiltration took place within the next weeks, and in six months a complete cicatrization was established, remaining constant for two years in spite of a relapse of otitis media, caused by an acute nasal catarrh. The hearing is of course as much injured as before.

(The many small operations, the considerable disturbance of function might have been avoided by an opening of the mastoid at the proper time, and the duration of the disease essentially abbreviated.—REVIEWER.)

(38) SEXTON sees no great advantage in leeches for the treatment of acute inflammations of the ear in children. He considers myringotomy seldom necessary, but puts great confidence upon the internal use of aconite, gelsemium, pulsatilla, and sulphide of calcium(!) S. M. BURNETT.

(39) BERG found in a recruit a fistular opening right above the incisura thyreoidea, leading into a canal 1 *cm.* deep. After splitting the canal to the median line another one presented, going right into the depth, 3 *cm.* long (just below the hyoid bone); the pharyngeal ostium could not be discovered with the probe nor with the laryngoscope. This fistula discharged since birth a viscid mucous fluid and transmitted distinct gustatory perceptions, on injections of different fluids. From his eighth to his fourteenth year the discharge from the orifice in the neck is said to have sometimes stopped, being substituted by a purulent offensive otorrhœa. At the attempt to obliterate the fistula by the galvanocautery, a stinging pain, and after two days otorrhœa set in. The otitis externa et media soon became regressive, the drumhead showed afterward retraction and opacity. The external parts of the ear were regularly developed. The author considers the first and the third visceral fissure as the origin of this malformation, in consequence of an arrest of development, since the fistula led to the depths below the hyoid bone which develops from the third visceral arch.

(40) MÉNIÈRE reports a case of acute rheumatism, introduced by an affection of the middle ear. An otherwise healthy man of thirty years was attacked with chills and violent pain in the right ear, which showed slight remissions from time to time. The drumhead lacked its lustre, was opaque, bulged forward, without injection of the vessels. In spite of antiphlogosis, neither perforation nor amelioration of the supposed otitis media occurred; but acute rheumatism on the fourth day, and then the aural affection improved rapidly. He mentions a similar case where rheumatic pains in the legs changed with aural pains, without the drumhead showing any abnormity; and a second one, in which a few days before the outbreak of acute rheumatism an alternating œdema of both mastoids appeared, with violent pain in the ear, which soon disappeared.

In the discussion GELLÉ mentioned a woman who suddenly was seized by a violent Ménière attack, substituted by an attack of asthma after eight days. Three weeks later an attack of gout set in, which was said to have begun in the same way ten years ago.

(41) A delicate boy, apparently hereditarily and neuropathically affected, nine years old, having suffered from various attacks of vertigo, once parotitis, frequently bronchitis, suddenly fell ill with difficulty of hearing. He improved under a catheterization, performed by another surgeon, which was difficult on account of a

deformity of the nasal septum, when suddenly complete deafness occurred in the right, and almost complete in the left ear. The objective examination of the drumhead, tube, naso-pharynx, showed no essentially morbid changes; bone-conduction absolutely destroyed. No symptom of a central affection or tuberculosis of the brain; a violent eclamptic fit occurred during observation. The treatment consisted in roborating diet. A few days later perfectly normal hearing returned in both ears, after a violent movement, with pain in the right ear and the sensation as if something was torn. Patient said that on the next day he had the sensation as if he had swallowed something hard and offensive.

The author considers the different diagnostic possibilities, but does not believe that a complete obstruction of a tube could produce such perfect deafness with abolition of bone-conduction in both, and thinks it not to be impossible to pronounce the whole trouble as a nervous affection on an anæmic hysteric basis. Similar disturbances in the further course of the boy's condition were in favor of this explanation.

(42) The patient, observed by MOURÉ, while pushing railway-coaches, received a double shock at the right parietal and left mastoid regions. He became unconscious, bled from both ears, especially from the right, and recovered after a long time, but was deaf. He exhibited a paralysis of the right facial nerve, a certain dulness and reduction of intellect. He does not hear the speech at all with the right ear; with the left a little. Bone-conduction destroyed on the right; very much reduced on the left. Subjective noises, often violent vertigo, exist without disturbance of consciousness. The right meatus is normal, the drumhead deeply depressed, nearly immovable, of normal color in front. The hammer is entirely deviated; behind and parallel with it, there is a linear scar, the consequence of a rupture of the drumhead caused by the injury. Behind and above a small grayish-yellow ossified place, representing a callus from a fracture of the ossicula. The left drumhead is somewhat thickened, but without a cicatrix. From the description the reviewer is not convinced that there was a fracture of the ossicula. The condition corresponds more to a bulging forward of the joint between incus and stapes.

(43) ESCHLE found, without exception, bacilli tuberculosis, three to eight in each field, in about twenty-five preparations of the aural discharge of a phthisic person, who suffered from

purulent otitis media sin. for several weeks. Stained with fuchsin according to Ehrlich's method, they became very distinct. Besides, the same patient furnished the appearance of blue pus, probably in connection with the same secretion of a patient in the same ward suffering from bed-sore.

The second case of Eschle is a boy who fell ill successively with scarlet-fever, nephritis, diphtheria, and suppuration of the lymphatic glands of the neck. He came under treatment on account of a suppuration of the left middle ear existing for several months after scarlet-fever. Perforation of the drumhead of the size of a pin's head, miserable appearance, no pulmonary disease evident, yet there were bacilli in the aural discharge. The perforation healed with a depression after one month's treatment, myringitis and chronic otitis media continuing; bacilli in the discharge. The appearance not improved in spite of roborating treatment and good care.

(44) Hessler, following Morpurgo, thinks that the essential feature of otorrhœa with perforation of Shrapnell's membrane is a suppurative process of the cavities around the neck of the hammer, the communication of which with the remaining portion of the tympanic cavity is stopped. According to that, he directs his treatment, using injections through the catheter, where the diseased parts can be reached from the tube. Since the probe reveals mostly caries of the hammer or of the opposite wall of the meatus, he treats this exactly according to the rules of surgery with nitrate of silver or galvanocautery. He uses the latter also for dilatation of a too narrow perforation. In those cases in which the above-mentioned place does not communicate with the tympanic cavity, he dilates the perforation by removal of the whole of Shrapnell's membrane, and makes a second opening in the posterior half of the drumhead with the galvanocautery, so that the hammer is almost or, if necessary, entirely separated.

(45) Roosa has not as yet reached the point of rejecting the syringe, properly and carefully used, as a means of cleansing the ear, nor excludes the so-called dry method. He considers the solutions of sulphate of zinc and alum, one to four grains to the ounce, the most useful. In order to remove granulations, he uses fuming nitric acid, chromic acid, and nitrate of silver in solutions of twenty to sixty grains to the ounce. He thinks alcohol to be valuable. S. M. Burnett.

(46) From a pretty extensive experience about the use of boracic

acid, POMEROY is an enthusiastic advocate of its use in chronic suppurative otitis, where neither polypi nor granulations exist. Where there are granulations, boracic acid remains without effect until they are removed. He uses nitrate of silver in strong solutions or in substance (melted to the point of a probe), in order to remove them.

(47) The purpose of KNAPP'S paper, in which the clinical history of a single case is given in detail, is to show, that a torpid desquamative inflammation of the mucous membrane of the middle ear may be treated most successfully by stimulation, tending to transform it into an acute one. Knapp used pellets of cotton, impregnated with glycerine and nitrate of silver. This caused the growth of polypi, which could be removed. After their removal the disease healed with restitution of the drumhead and good hearing. S. M. BURNETT.

(48) There was otitis media chronica purulenta with hyperostosis of the outer wall of the mastoid and increased vascularity of the pyramid of the temporal bone. The mastoid antrum was filled with a cheesy mass, constituting the focus of a pyæmic affection, leading to abscesses in the lungs, and later, in the liver. The opening of the mastoid process made the local symptoms temporarily disappear, but had, of course, no influence upon the pyæmia. The case is given in great detail. A discussion followed on the opening of the mastoid. Among those who advocated the operation were: Knapp, Kipp, Grüning, whereas others, Strawbridge, Theobald, Sexton, Burnett, and Holt thought the operation was only seldom indicated. S. M. BURNETT.

(49) L. TURNBULL first makes some general remarks upon the nature of the affection and the usual methods of treatment. Then follows in detail a report of a case of encephaloid cancer, affecting the temporal bone, the mastoid cells, and the antrum, presenting itself at first as a polypoid growth from diseased bone in the osseous external meatus. The boy was four years old. The tumor was removed three times, relapsed each time, and ended fatally.

S. M. BURNETT.

(50) MARTIN'S patient, a boy seven years of age, had purulent discharge from the right ear for several years. During an acute attack the mastoid became painful again and swelled. Soon followed discharge of offensive pus from the meatus, together with swelling of the neck, forehead, and eyelids. There was exophthalmus and congestion of the conjunctiva. The parts round the

jugular vein were hard and tender. Temperature 104° F. The patient died at the eighth day. No post-mortem.

S. M. BURNETT.

Nervous Apparatus.

53. Drs. G. LEMOINE and M. LANNOIS. On complete one-sided and double deafness after parotitis. *Revue de Médecine*, vol. iii., Sept., 1883.

54. Dr. D. B .ST. JOHN ROOSA, New York. The affections of the ear in the course of parotitis. These ARCH., vol. xii., page 1.

55. Dr. HODGSON, Brighton. Four cases of nerve-deafness. *Brit. Med. Journ.*, Sept. 29, 1883.

56. DAVID WEBSTER. A case of syphilitic disease of the labyrinth with poisoning with bromide of potash. *The Planet*, April 15, 1883.

57. Dr. C. MIOT. Reflex deafness; recovery. *Revue mens.*, No. 9, 1883.

53. LEMOINE and LANNOIS add an observation of their own to a careful review, given in detail, on all published cases of mumps-deafness.

A soldier, twenty-three years of age, was seized with disorders of general health, intense pain in ear and head, violent roaring and other subjective noises. On the fourth day, during an epidemic of mumps, double parotitis and deafness set in. The different theories for the explanations of mumps-deafness are given and rejected, and the disease is considered by the authors, according to Moos, as a general disease, localizing itself commonly in the salivary glands, sometimes in the testicles, and seldom in the prostate, breast, etc., and in the labyrinth.

(55) HODGSON gives the following cases of nerve-deafness: (1) Labyrinth deafness after mumps. A boy of fifteen years was affected with orchitis on the sixth day of mumps. When the orchitis was subsiding, headache, severe vertigo, roaring, and one-sided deafness occurred. The deafness was complete and remained permanent. (2) Labyrinth-deafness after mumps. A girl of fifteen years had suddenly become deaf, two years before, during mumps. Headache, vertigo, and roaring did not exist. (3) Labyrinth-deafness from hereditary syphilis. A girl, ten and a half years of age, became perfectly deaf within twelve months. The incisors had the characteristic appearance of that affection.

In the 4th case there was also complete deafness on both sides, caused by hereditary syphilis.

(56) The chancre was observed in 1865. In October, 1876, deterioration of hearing was first noticed, without subjective noises. Pharynx, external and middle ears, in good condition. Left ear perfectly deaf in November. Right, H.D. $\frac{30}{60}$. Inunctions of blue ointment, and large doses of bromide of potash were ordered, in order to obtain sleep. Bromism developed, disappearing after discontinuing the remedy. Then iodide of potassium in large doses was taken. In January, 1877, the watch could be heard by immediate contact on the left side, and the disagreeable head symptoms disappeared. S. M. BURNETT.

(57) A girl, fourteen years of age, fell sick with various nervous complaints, which had to be ascribed probably to disorders of menstruation, with roaring and a high degree of difficulty of hearing on the right, and moderate diminution of hearing on the left. After removal of a large plug of cerumen, a certain amount of improvement began, although perfect recovery was effectuated by the induction current. The air-douche was not used. MIOT proposes some peculiar terms for the test of hearing.

Nose and Naso-Pharynx.

58. W. F. WALSHAM. Nasal stenosis as a cause of chronic nasal and naso-pharyngeal catarrh. *Lancet*, p. 1121, 1883.

59. DEMME, Bern. On the diagnostic significance of bacilli tuberculosis in infancy. *Berliner klin. Wochenschrift*, No. 15, 1883.

60. HOPMANN, Cologne. On the nomenclature of tumors of the mucous membrane of the nose. *Wiener med. Presse*, No. 38, 1883.

61. HACK, Freiburg. Rhinological controversies. *Fortschritte der Medicin*, No. 20, 1883.

62. M. DEPRÈS. Foreign bodies in the nose. *Gazette des hôpitaux*, July 31, 1883.

63. BARATOUX. Necrosis of the nasal bones. Expulsion of the central part of the sphenoid bone. *Revue mens. de laryng., d'otol.*, etc., No. 8, 1883.

64. BARATOUX. Contributions to the study of the diseases of the naso-pharynx. Adenoid excrescences. *Revue mens.*, No. 12, 1883.

65. R. E. SWINBURNE. Adenoid excrescences in the nasopharynx and their relations to affections of the middle ear. *Med. Record*, Oct. 6, 1883.

66. GELLÉ. On chronic rheumatic angina, etc. *Revue mens.*, No. 12, 1883.

67. TH. SCHECH, of Munich. The diseases of the neighboring cavities of the nose and their treatment. Munich, 1883.

68. J. HABERMANN, of Prague. Massage for chronic facial œdema after habitual erysipelas. *Prager Med. Wochenschr.*, No. 40, 1883.

69. W. F. WALSHAM. On an easy method of posterior rhinoscopy. *Lancet*, 1883, page 142.

70. F. CHRISTMAS, Dirckinck–Holmfeld of Copenhagen. Experimental investigations on the construction of the regio olfactoria; with a plate. *Nordiskt med. Arkiv.*, vol. xv., issue 3, 1883.

(58) WALSHAM discusses the frequent occurrence of the diminution of the lumen of the nose by deformities of the septum and hypertrophy of the turbinated bones. Both may be the causes of chronic nasal catarrh. Walsham confirms Delavan's experience, that, in cases of bending of the septum to one side, hypertrophy of the turbinated bones of the opposite side exists. The treatment of the deformities consists in adjustment by crosswise incision into the cartilage. In general hypertrophy of the inferior or middle turbinated bones, the bone can easily be removed by means of a polypus-forceps. Walsham experienced neither danger nor trouble from this operation.

(59) DEMME found a group of small yellow tubercles and ulcers at the septum as the cause of ozæna scrophulosa infantum in a boy eight months old, suffering from it for two months, who had neither hereditary syphilitis nor a tuberculous affection. He found in the secretion of the nose more or less bacilli tuberculosis. Shortly after this observation an acute meningitis supervened, leading rapidly to death. The *post-mortem* examination revealed tuberculous basilar meningitis; all other organs were free. In the tubercles and ulcers of the nasal mucous membrane, taken from the corpse, the bacilli were in moderate number, free or in giant cells. Demme thinks it probable, that the tuberculous affection of the nose produced meningitis along the vessels. The nasal affection possibly was brought about by infection from the phthisical step-father of the child. On examina-

tion of some cases of common scrophulous rhinitis in children Demme did not discover any bacilli tuberculosis.

(60) Compare above Steinbrügge's report.

(61) HACK asserts that a great number of exudative so-called rheumatic affections are produced by reflex irritation of vaso-dilatator nerves from an irritability of the nose, caused by slight affections. The circumscribed, transient œdema in the face of some individuals, due to a cold, belongs to this category. In some cases he experimentally produced it by irritation of the mucous membrane of the nose, and could remove it permanently by destruction of the membrane, as well as the inclination to painful stiffness of the neck, which he found repeatedly in connection with affections of the mucous membrane of the nose, and which is not due to a contraction but to an exudation, as shown by rheumatic muscular callus. The scotoma, caused by a cold, and the transient amaurosis, seldom produced by the same cause, which he cured by removal of irritations of the nose in some cases, are brought about, according to the author, by the reflex swelling of the optic neurilemma, and the neuralgia, observed by him and others in acute coryza, is caused by hyperæmia and swelling of the neurilemma, an explanation in harmony with the views of neurologists on neuralgia. The rheumatic exudations in different joints are caused in the same way, sometimes simultaneous with the œdema above described, sometimes with acute coryza, or as a consequence of a nasal operation, as vaso-dilatator exudations in consequence of nasal irritations. (The mucous membrane of the urethra, exposed more rarely to irritation, shows an analogous sensitiveness : exudations into a joint after catheterism.)

The author believes that it cannot be decided yet of what nature this irritation of the mucous membrane of the nose may be, and how it is connected with the catarrhal affections or the neoplasms, but he declares that all these so-called rheumatic affections may be successfully treated in a surgical way.

62. DESPRÈS discusses the different methods of removing foreign bodies from the nose, and calls attention especially to the danger, arising from the fact, that a foreign body pushed backward might enter the larynx. For extraction he commends a curette, provided with a joint, according to Le Roy d'Etiolles. The instrument has to glide gently under the foreign body to the posterior wall of the pharynx, being constantly in contact with the nasal floor. The curette has now to be bent in an angle and

drawn back, in order to remove the foreign body. (The removal is performed more simply, more certainly, and more agreeably for the patient by means of any hook-shaped probe.—REV.)

63. BARATOUX gives in detail a case of a high degree of destruction of the osseous frame of the nose, caused by syphilis. The offensive discharge, existing for years, was stopped by removal of a sequestrum, belonging to the middle part of the ethmoidal bone.

64. BARATOUX describes the well-known symptoms of adenoid excrescences of the naso-pharynx. He says, that only by the posterior rhinoscopy an exact diagnosis can be obtained, and he illustrates this by a case where a patient, exhibiting the symptoms of an enlarged tonsil, was operated upon by another physician with a forceps, although all the symptoms were really brought about by an excessive hypertrophy of the posterior end of the right inferior turbinated bone. A profuse hemorrhage, which could only be stopped by tamponade, followed the fourth sitting. Baratoux discovered by rhinoscopy not only the above mentioned pathological conditions, but saw that the hypertrophic end of the turbinated bone, as well as the tubal ostium, the mucous membrane of the roof of the pharynx, and the nasal septum were extensively lacerated. Baratoux recommends galvano-cauterization for treatment.

65. SWINBURNE finds adenoid excrescences at an average of one to six and a half of his patients suffering from diseases of the middle ear. He prefers Jarvis' snare to every other method for removal. Next is the galvano-cautery. S. M. BURNETT.

66. GELLÉ has very often seen a very marked pharyngitis, not very troublesome, in people suffering from gout or rheumatism, with a remarkable tendency to affections of the ear. This affection is not limited to the mucous membrane, which becomes glittering, folded, and thickened, but is accompanied by œdema of the submucosa, so that the pharyngeal cavity becomes considerably narrowed. In connection with this he has sometimes noticed tin. aur., chronic catarrh, and especially Ménière's complex of symptoms ; the vertigo, as well as the tinnitus, diminished or disappeared entirely with the amelioration of the pharyngeal symptoms. (The establishment of an "angine rhumatismale" does not seem to be legitimate.—REV.)

67. SCHECH discusses in detail the diseases of the neighboring

cavities of the nose, the antrum Highmori, frontal, sphenoidal, and ethmoidal sinus, without giving any new points.

67. HABERMANN applied massage successfully in a case of chronic nasal catarrh and a case of ozæna, accompanied by a high degree of thickening of the tip of the nose, the upper lips, cheeks, and eyelids. In opposition to Hack, he considers the single attacks of erysipelas, leading to chronic œdema, as typical affections, caused by bacteria, and the rhagades at the mouth, existing in both cases, as the possible ostia of infection.

(69) WALSHAM recommends as an easy method of posterior rhinoscopy to push an india-rubber tube through the nose, and when it appears under the velum, to draw it out from the mouth with a pair of forceps, and to bring the soft palate forward. Then a free view into the choanæ is easily obtained, without causing any trouble to the patient. The india-rubber tube is better than the tapes recommended by American surgeons. (The author does not seem to know that Türk used this method.)

(70) The author ventilates the question again, whether the epithelial cells or the olfactory cells have to be considered as the real terminal organs of the olfactory nerve (M. Schultze and S. Exner). He made experiments on rabbits, guinea-pigs (*cavia cobaya*), and frogs (*rana esculenta*). After trepanation he separates the bulbi olfactori from their connections and removes them. In a short time (fourteen days in warm-blooded animals, one month in frogs) a destruction of the olfactory cells is visible. They become filled by fat granules, and the processes disappear. In four or five months the middle cells begin to degenerate in warm-blooded animals. In frogs the author saw no change in these cells. The frogs are only to be used in the summer months on account of the very slow circulation. The results of the author are:

1. The olfactory cells have to be considered as real terminal organs of the olfactory nerve.

2. The epithelial cells cannot be in direct connection with the olfactory nerve.

3. M. Schultze's assertion about the organization of the mucous membrane of the nose is correct, and the observations of S. Exner are not.

VICTOR BREMER.

MISCELLANEOUS NOTES.

We heartily recommend a new text-book on Otology which appeared a month ago, namely : **A Manual of Diseases of the Ear,** for the use of Students and Practitioners of Medicine. By THOMAS BARR, M.D., of Glasgow. Jas. Maclehose & Co., 1884. This book has 530 small octavo pages, is beautifully printed on handsome paper, and illustrated by 115 very well executed wood-engravings. Its style is clear, easy, correct, and careful. The first, introductory, part of 152 pages, treats of *general otology*, viz. : (*a*) the examination of the ear, (*b*) the causes of ear disease, (*c*) the affections of the nose and throat in connection with ear disease, (*d*) the methods of treatment. The remainder of the book is devoted to *special otology*, with an anatomical and physiological description at the beginning of each chapter. At the end of the work are numerous formulæ of local and general remedies, with full statements of their modes of application and their indications. The book holds a happy medium between the meagre and insufficient treatises which contain the names, titles, and claims of their authors in full, but only a fraction of the subject-matter of otology, and the exhaustive and fundamenal works, of which Politzer's recent book may be mentioned as one of the best representatives. Barr's manual deserves to have a large circulation, and would undoubtedly obtain it if there had not been an overproduction of otological text-books during the last years. Diffusion of otological knowledge has been more extensive than production. H. K.

A **" Société Française d'Otologie et de Laryngologie "** has been formed in Paris. Besides the active members it consists of a number of honorary and corresponding members, mostly chosen from abroad. The Société publishes its transactions.

The **Annales des Maladies de l'Oreille, du Larynx, et des Organes Connexes,** founded in 1874 by Isambert and Krishaber, deceased, and Ladreit de Lacharrière, and since

that time regularly issued in its original form, is now to be made, under the direction of the surviving editor, an international journal, and is to be published in both French and English.

The direction and publication will remain in Paris, and the editors selected for the laryngological and otological departments respectively are: in England, Morell Mackenzie and Woakes; in Belgium, Capart and Ch. Delstanche; and in America, J. Solis-Cohen and Clarence J Blake.

Dr. WEBER-LIEL, of Berlin, has been appointed **extraordinary professor** of otology at the University of Jena.

Dr. J. PATTERSON-CASSELS, of Glasgow, **died** in April of this year. His contributions to otology were numerous and meritorious, as our readers well know.

Fig. 1

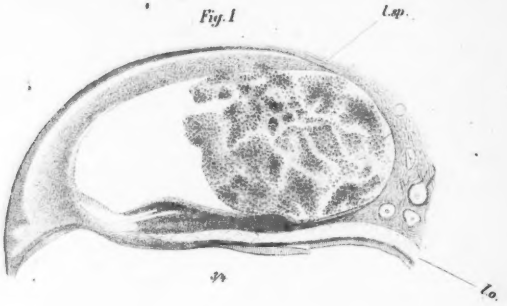

Fig. 2

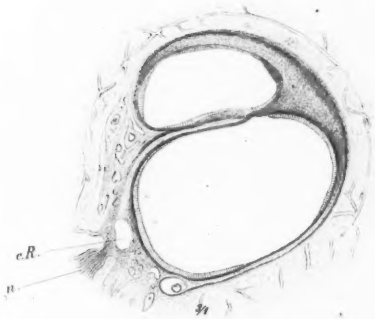

Fig. 3

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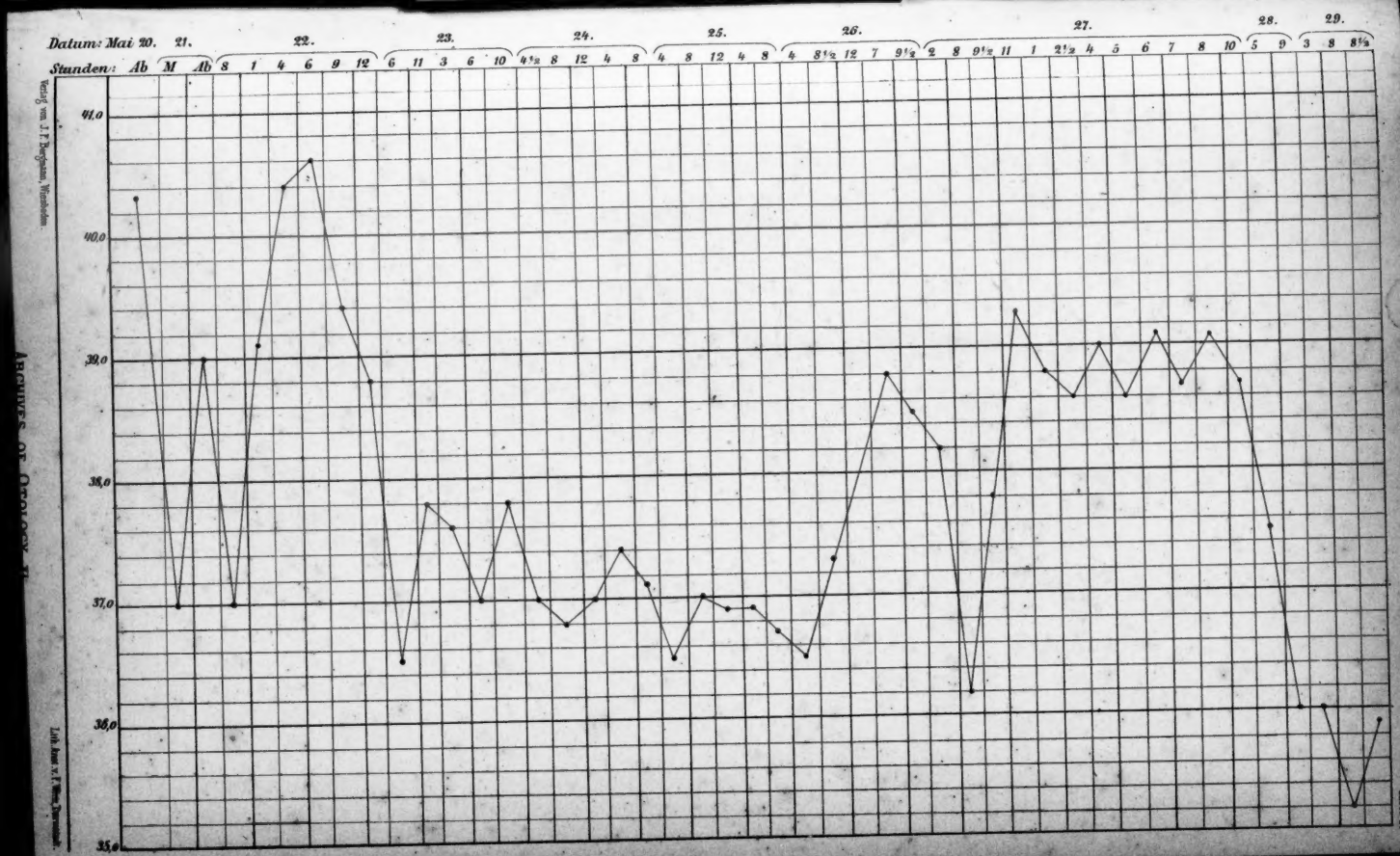
NOTICE.

The accompanying plate, Tab. I., Vol. XII., refers to the paper of Moos on page 136 of volume XII. We ask our readers to pardon the omission and put the plate in its proper place.—Ed.

Article 3 in the June number of this volume should precede Article 2, as it refers to it. K.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